SOUND TRANSIT

Design Standards and Guidelines for Sound Transit Projects: Sounder & ST Express Passenger Facilities

For Reference Only

Not a Controlled Copy

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Chapter 1 – Introduction to Design Standards and Guidelines Manual

Sound Transit will continue to plan, design, and construct bus transit and commuter rail passenger facilities to connect regional employment and population centers in King, Pierce, and Snohomish counties. This manual identifies Sound Transit's policies, standards, and guidelines for Community Connections projects within the Capital Projects Department. Collectively, these facilities include Sounder stations, ST Express park-and-ride lots, transit centers, and freeway stations. Within this manual, the facilities are referred to collectively as *Capital Projects*.

This manual updates and integrates two manuals prepared separately for Sounder and ST Express facilities. The new manual supersedes the *Sound Transit Station Design Manual* (December 1998) and the *Sound Transit Regional Express Transit Facility Design Standards and Guidelines* (February 2002).

This manual for Sounder and ST Express passenger facilities provides project managers and consultants with technical direction on designing passenger facilities. The manual also is intended to assist the public, communities, and public officials in better understanding the various aspects of design for Sounder and ST Express facilities in their communities.

It is the express intent of Sound Transit for these standards and guidelines to be followed in the design of Sounder and ST Express passenger facilities. These facilities will generally be located in municipal jurisdictions, state rights-of-way, or unincorporated jurisdictions. Sound Transit's standards and guidelines may occasionally differ from local jurisdictions' codes and standards. The designer's use of jurisdictions' codes and standards, rather than Sound Transit's, **SHALL** be subject to Sound Transit approval. Deviations from the standards provided in these documents **SHALL** be identified by the design consultant and approved in writing by Sound Transit.

Whenever the phrases "local jurisdiction," "municipality," or "authority having jurisdiction" are noted, these terms **SHALL** be understood to mean the Washington State Department of Transportation (WSDOT), Snohomish County, King County, Pierce County, and cities where projects are being developed as the authority having jurisdiction.

1.1 Organization and Use of Design Standards and guidelines

This section describes the organization of the design standards and guidelines manual. It also identifies how the manual should be used by designers, including how *standards and guidelines* differ from one another and how they are distinguished in this document.

1.1.1 Organization

These guidelines consist of 14 chapters, with each chapter addressing a specific design element:

1.1.2 How to Use These Standards and Guidelines

This manual contains both standards and guidelines that will be used in the design of Sounder and ST Express passenger facilities. The text included in the accompanying box summarizes the distinction between standards and guidelines. This box is being provided at the start of each chapter.

Design *standards* indicate a required direction for a particular design feature. Language relating to standards will include the word ***SHALL***. Exceptions to the standards will be considered by Sound Transit if the designer presents information indicating that meeting the standard would not be practical given the application to a specific project. The designer **SHALL** obtain written approval from Sound Transit's project manager for any deviation from the standard.

Design *guidelines* are intended to provide a preferred but not necessarily required direction for a particular design feature. The guidelines will be designated with the word *should*.

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

The manual includes hyperlinks at the beginning of each chapter to enable designers to quickly navigate through that chapter. For instance, hyperlinks are provided below for Chapter 1, which consists of the following sections:

Where appropriate, this manual also includes hyperlinks to other chapters, websites, guidelines, or publications. These links include further information on the subject matter.

1.2 Background Information

This section provides background information for the design standards and guidelines, including applicable codes and ordinances, relationship with Sound Transit Link design criteria, guiding principles, and relationship with guidelines of other agencies.

1.2.1 Applicable Codes and Standards

The *Design Standards and Guidelines Manual* is intended to provide direction to Sound Transit staff and project design consultants. Following is a list of some of the codes and standards that will be referred to throughout these guidelines. Unless otherwise noted, the designer SHALL use the current, adopted version of any code or standard. Links to the appropriate external websites are indicated with the ► symbol.

Washington State Building Code/IBC 2003 ►

Washington State Department of Ecology
Stormwater Management/Quality Guidance ►

Washington State Department of Transportation ►
Standard Plans for Road, Bridge, and Municipal Construction
Design Manual for Roadway Design
Standard Specifications for Road, Bridge, and Municipal Construction
Highway Runoff Manual
Pedestrian Facilities Guidebook
Hydraulics Manual

Local Municipalities
Energy Codes
Street Improvements Manuals
Traffic Signal Design Guides
International Fire Codes

Lighting Design Criteria
Local Amendments (IBC and WSDOT/APWA)

Other Codes and Standards

Manual of Uniform Traffic Control Devices ►
AASHTO (latest manual) ►
NFPA 130 (latest version) ►
AREMA ►

1.2.2 Relationship between Sounder/ST Express Design Standards and Guidelines, and Link Light Rail Design Criteria

For Sound Transit's Link light rail transit facilities, standards and guidelines have been identified in the report *Design Criteria for North and Airport Link* (Draft B – May 2005). Where appropriate, information from the Link Design Criteria has also been used for the Sounder and ST Express design standards and guidelines. For example, the Link Design Criteria provided direction on types of materials that can be used for elements such as finishes.

1.2.3 Guiding Principles

The Regional Transit Long-Range Plan for Sound Transit provides major guidance for Sounder and ST Express bus facility development. In the 2005 update of the long-range plan, the agency identified principles that help to guide the design of transit facilities. Following are some of these principles from Sound Transit's Long-Range Plan:

- New park-and-ride lot capacity improvements will be prioritized at locations where HOV direct access and regional bus service increases demand and where no surplus capacity exists. Criteria used to guide park-and-ride lot investments include: HOV direct access, forecasted demand on local and regional services, and achieving standards for current and projected use.

- Sound Transit is committed to supporting non-motorized means of transportation such as bicycles and foot traffic. The long-range plan provides space for bicycles on buses and trains as well as safe bicycle storage at transit stations. The plan also includes, where practical, improvements for secure bicycle travel as part of HOV improvements and within rail corridors.

- Transit facility designs will be flexible, allowing each station to reflect the community it serves while providing standard features to ensure smooth and accessible transfers for transit customers from one type of public transportation to another. Standard features may include improvements to access by bus, bicycles and walking; intermodal transfer facilities; and bus layover space.

- Recognizing the mutual benefits of Sound Transit's transportation investments, local public transportation agencies, communities, and local governments (Sound Transit's partners) may identify improvements that exceed standard facility designs. In such instances, partners will work with Sound Transit and contribute

toward the costs of improvements, in accordance with Sound Transit's adopted Scope Control Policy.

1.2.4 Relationship to Guidelines of Other Agencies

In some locations, Sounder and ST Express bus service will operate at facilities built by other agencies. In many cases Sound Transit will be one partner sharing in the funding, development, use, and operation of a facility with other transit agencies. In these instances, the affected jurisdictions, as well as Sound Transit, will review design and construction. Authority to oversee the design process, including review by affected agencies, will typically fall to the project sponsor, as described in Sound Transit's *Good Neighbor Policy*.

The designer **SHALL** request a hardcopy of the *Good Neighbor Policy* and with relevant background materials from Sound Transit's project manager.

1.3 Design Review Process

This section describes how to establish the development program for the facility and how to move forward in the review and approval of a facility design. The development program for a facility includes a conceptual level identification of major elements that will make up the transit facility, including but not limited to, bus boarding areas and/or rail station platforms, passenger amenities, parking capacity (if necessary), etc.

Before a transit facility is designed, the designer **SHALL** clarify how the development program and facility size will be determined. In order for a transit facility to be truly functional and responsive to the community it serves, the designer should recognize thresholds for the trains, buses, and specialized transportation services that may serve the facility. These thresholds, to be identified by Sound Transit, will include the estimated maximum number of patrons that may be waiting at any given time.

1.3.1 Planning and Design Horizons

Transit facilities are generally designed to function both upon opening and over a longer-term horizon (usually until at least 2020, 2025, or 2030, depending on the specific project) with major additions or modifications. For Sounder and ST Express, most of the passenger facilities identified under *Sound Move* have been built or are under construction and expected to open by 2011. *Sound Transit 2* (ST2) is the next phase of the Long-Range Plan's implementation.

1.3.2 Public Process

All Sound Transit projects include a public involvement process to solicit input from the public, to integrate facilities into neighborhoods and communities, and to identify those elements of a transit environment that are most desired by the community. Sound Transit requires that appropriate public involvement processes be used to obtain this input. Also, for public meetings, a record of the date, time, subject, and number of attendees **SHALL** be maintained. If legal notices are required for a meeting, affidavits of the publication notice **SHALL** be filed with Sound Transit's document control system.

1.3.3 Agency Review Role

Sound Transit's facilities will generally be located in municipal jurisdictions, state rights-of-way, or unincorporated jurisdictions. In addition, most Sounder and ST Express facilities are shared with local transit providers or transit partners. Sound Transit partners with appropriate local transit agencies, local jurisdictions, and WSDOT in developing facilities. As the operator of Sounder services, BNSF has a role in the review of commuter rail facilities design.

If Sound Transit is the primary project sponsor, Sound Transit will generally take the lead in reviewing plans and documents, and coordinate this review with other affected jurisdictions. Freeway transit facilities are usually an exception to this rule, since these facilities generally require a design and review lead from WSDOT.

Sound Transit and the design team **SHALL** also coordinate with federal agencies, including the FTA and FHWA, when funding includes federal sources, environmental and resource agencies, the local permitting agency, and local law enforcement agencies.

1.3.4 Typical Phases for Review

For each project the designer **SHALL** develop a schedule that incorporates public process, preliminary design, and environmental documentation and review. Generally, a Sound Transit project is divided into the following phases:

- Preliminary Engineering/Environmental Documentation (PE/ED) (typically to 30 percent design)
- Right-of-Way Acquisition (usually concurrent with Preliminary Engineering or Final Design but is not reviewed in a manner similar to design phases.)
- Final Design, Specifications, and Permits (60 percent, 90 percent, and 100 percent submittals)
- Bidding and Construction.

These phases may be altered if, for example, a project is to be developed as a design-build project. The project designer **SHALL** include adequate review cycles with appropriate local, state, and federal agencies in the schedule.

More specific information on review schedules can be provided to the designer by ST staff. This will be based in part on the agency's experience with facilities that have been completed or are currently under construction.

1.4 Range of Elements

This manual addresses passenger facilities that are or will be served by Sound Transit's Sounder commuter rail and ST Express regional bus routes. A major goal of the manual is to have a single-point resource for design standards and guidelines affecting both Sounder and ST Express passenger facilities.

The manual covers a range of elements dealing with facility design such as landscape and structural features that could be located at a facility. However, this manual also addresses design features that go beyond specific facility elements, such as integrated programs and site layout.

The following sections further describe the elements addressed by the design standards and guidelines manual:

- Chapter 2 – Integrated Programs and Initiatives, covers overall program efforts as well as those design elements that are common to all facilities. Items include:
  - Accessibility/ADA
  - Signage
  - Public art
  - Security
  - Sustainability

- Chapter 3 – Site Layout includes:
  - Connections to the community
  - Access to the facility
  - Location of boarding platforms and zones
  - Location of park-and-ride facilities (surface & structured)
  - Location of communications buildings
  - Applying security/safety principals

- Chapter 4 – Parking includes:
  - Park-and-ride (both surface and structured)
  - Passenger drop-offs
  - VanShare/CarShare

- Chapter 5 – Public Areas includes:
  - Sounder commuter rail station platforms
  - ST Express bus platforms
  - Pedestrian bridges
  - Canopies and windscreens
  - Bicycle storage
  - Seating and benches
  - Customer information

- Chapter 6 – Operational Support includes:
  - Operators' restrooms
  - Security office
  - Customer service office and window
  - Janitor's/Storage room
  - Staff parking

- Chapter 7 – Civil Engineering Elements includes:
  - Drainage

- Chapter 8 – Landscape Architecture Elements includes:
  - Overall responsibilities of landscape architect
  - Objectives of landscape architectural elements
  - Codes and standards
  - Site preparation
  - Plant materials

- Chapter 9 – Structural Elements includes:
  - Building codes
  - Soils and geological data
  - Reinforced and pre-stressed concrete
  - Masonry
  - Structural steel
  - Foundations

- Chapter 10 – Architectural Elements includes:
  - Common design features
  - Criteria for selection of materials

- Chapter 11 – Mechanical Elements includes:
  - Environmental control systems
  - General mechanical considerations

- Chapter 12 – Lighting Elements includes:
  - Codes and standards
  - Standard equipment
  - Lamps
  - Illumination levels
  - Site and plaza lighting
  - Vehicular access lighting
  - Pedestrian access lighting
  - Station platform and public area lighting
  - Control of lighting systems
  - Emergency power and lighting

- Chapter 13 – Communications and Technology Features includes:
  - Process for technology infrastructure
  - Wireless data infrastructure
  - Closed circuit television cameras
  - Customer emergency stations
  - Public telephones
  - Staff telephones
  - Variable message signs/passenger information systems

    - Public address system
    - Ticket vending machines
    - Smart Card readers
    - Static signage
    - Communications and electrical room/building

- Chapter 14 – Electrical includes:
    - Fire life safety systems
    - Boxes and fixtures
    - Electrical rooms

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Chapter 2 – Integrated Programs and Initiatives

This manual provides design standards and guidelines on many distinct and separate elements of a transit facility, such as parking and structural elements. Some features of a facility need to be integrated throughout the facility, and in some cases, join elements together, so they can be effectively used by Sound Transit's customers.

Chapter 2 provides standards and guidelines elements below that relate to integrated programs and initiatives:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

2.1 Accessibility/ADA

The Sound Transit Board adopted *Sound Move*, the Ten-Year Regional Transit System Plan, on May 31, 1996. *Sound Move* has an overall objective of improving mobility and accessibility for all, including pedestrians, bicyclists, persons with disabilities, and other public transportation customers. As called for in *Sound Move*, there are several means to achieve this, including, but not limited to, regional wayfinding.

Sound Transit's Accessibility Design Standards and Guidelines[1] have been developed to support the designs for all three systems: Sounder, ST Express bus, and Link. Modifications and additions to these standards and guidelines will be made from time to time, based on regulation changes, research, and new technological developments. These standards and guidelines **SHALL** be followed for all projects. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

In keeping with this commitment, Sound Transit requires that its contractors, consultants, and staff follow the applicable Americans with Disabilities Act (ADA) regulations and related standards in designing, constructing, and operating facilities. In addition to Sound Transit's Accessibility Design Standards and Guidelines, see also ADA Standards for Accessible Design. This includes all three modes of public transportation, Sounder

[1] *Accessibility Design Standards and Guidelines* (Sound Transit, October 2004).

(commuter rail), ST Express (express bus) and Link (light rail); the signage program; and purchase of transit vehicles which meet the accessibility standards.

A Citizens Accessibility Advisory Committee has been created by Sound Transit to provide oversight to Sound Transit programs that affect accessibility for customers. Sound Transit staff and consultants may be called upon to brief the Committee on accessibility issues and projects involving ADA compliance.

Sound Transit's Accessibility Design Standards and Guidelines include design review checklists. These checklists are vital tools for project managers and consultants to ensure that designs include an evaluation for accessibility and compliance with the ADA and related standards. Using the checklists throughout the design process will eliminate the need for major revisions at the end of the design process.

2.2 Signage

This section provides the designer with direction on design relating to signage in two major categories: 1) Use of Sound Transit's existing signage design manual, and 2) Design of wayfinding signage. The following further describes elements under these categories.

2.2.1 Sound Transit Signage Design Manual

In 2000, Sound Transit developed a *System-Wide Signage Design Manual*[2] that covers many types of standardized signs. Designers **SHALL** follow *Sound Transit's System-Wide Signage Design Manual* for any signing at passenger facilities. That manual **SHALL** also be referenced and supplemented by signage guidelines covered in this manual. The Sound Transit project manager can provide the most current version of the signage manual to the designer.

To serve customers as effectively as possible, signage should:

- Give people the information that they need when and where they need it.
- Make transit facilities easy to identify and to navigate system-wide (see Section 2.2.2 of this manual).
- Use language that people understand.
- Use the best organizational techniques.
- Provide a seamless experience throughout their journey in the central Puget Sound region by downplaying differences between the various transit agencies' information systems.

[2] *System-Wide Signage Design Manual* (Sound Transit, 2000)

- Comply with accessibility guidelines, including ADA, and acknowledge needs of multi-lingual customers. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

Other important goals from Sound Transit's perspective include:

- Sound Transit should be identified on site at all of the new transportation facilities and at the transit partners' facilities.

- Signage should be selected for easy long-term maintenance of the system. For example, a modular (kit-of-parts) design, that is efficient in production and flexible for future expansion, while also being economical in materials and repair.

- Signage **SHALL** include items relating to regulatory enforcement (e.g. no skateboarding, no smoking, no parking here, etc). Regulatory signage **SHALL** be legible under normal conditions at a distance of not less than 50 feet and **SHALL** be placed at all points of entry and at other points along the perimeter line as necessary.

- Walls at ends of passageways, opposite major entrances, or leading to exits, **SHALL** be kept free of miscellaneous doors and advertisements so that they may be used for information graphics.

- Informational/education signage should be provided on items of public interest. Examples include information on environmental treatments, such as treatment of runoff and use of sustainable materials at the site.

- Informational signage should also identify the effects of public transit service on the region's mobility and economy.

- Any informational signage should be developed in a manner that will not require updating.

2.2.2 Wayfinding Signage

One key to helping customers find their way around a transit facility is to use uniform signage, as provided by the standards and guidelines in this manual. Transit facility designers in this region have the challenge of coordinating a wayfinding program that involves not only Sound transit, but incorporates other transportation providers who either share space with Sound Transit or are adjacent to Sound Transit facilities. Therefore, Sound Transit's program **SHALL** be sensitive to these other needs while focusing on the importance of providing a seamless, and therefore familiar, wayfinding program for the regional transportation network.

The wayfinding objective envisions the use of facilities, objects, materials, surfaces, color, and graphics to aid persons of all abilities in successfully finding their way to Sound Transit's transportation services. Designers will be challenged to find the appropriate balance of visual, tactile, and audio treatments to achieve this objective.

More specific guidance on wayfinding signage design is as follows:

- Insofar as possible, architectural elements, landscaping, and other design features **SHALL** identify entrances, exits, traffic routes, etc. without signs.

- The number of signs **SHALL** be kept to the minimum necessary for passenger guidance.

- Signs **SHALL** be located for maximum visibility at or before all decision points within facilities.

- Signs **SHALL** be placed at frequent enough intervals so that infrequent or new users can readily find their way without assistance.

- Space for transit information, including a map showing routes serving the facility **SHALL** be provided immediately adjacent to major passenger gathering areas (for example, fare collection equipment at Sounder stations) and at other customer decision points (such as platform areas).

- Station name signs **SHALL** be located so they may be easily seen by passengers in transit vehicles, both sitting and standing.

- If a transit facility is funded in whole or in part by Sound Transit, the monument sign will indicate that the project was supported by Sound Transit. This identification **SHALL** be provided even if the facility is operated by another agency and/or no Sound Transit service is provided at the facility.

- Wayfinding signage should be available at the following locations:

    - Along streets serving the facility, with entrances clearly indicated.
    - Within the facility to indicate direction to the boarding platform and to provide both motorists and pedestrians with information on nearest exits from the facility.
    - For bicyclists, direction should be provided to bike lockers and racks.

- Signage should be provided that will relate outbound passengers to the surrounding community.

2.3 Public Art Program (STart)

Sound Transit has established an art program, entitled "*STart*", which incorporates works of art within its passenger facilities and their surrounding sites. Designers should refer to the *STart* Program for the guiding principles and goals for the STArt Public Art Program.

The *STart* program takes into consideration the functional requirements of Sound Transit facilities to facilitate pedestrian movement. The following sections include directions for incorporating art in ST Express and Sounder passenger facilities:

2.3.1 Architectural Integration

Art **SHALL** be commensurate with the volumes of the interior or exterior spaces in which the artwork is located. Artists should be included in the design process at an early stage (i.e., no later than the 30 percent design level) to ensure the following:

- Aesthetic compatibility (with other design components).
- Ease of maintenance.
- Provision of any necessary infrastructure.
- Coordination with local jurisdiction/community as the project design becomes finalized.

2.3.2 Location Criteria

- The placement of art **SHALL** recognize the primary importance of functional clarity in design.
- The location of art **SHALL NOT** impede patron circulation in passageways, circulation areas, surge areas, and platform areas; nor **SHALL** it pose a safety hazard.
- Art may support, but should not obscure or compete with, essential system signage and information.

2.3.3 Maintenance and Performance Criteria

- All materials used in the fabrication of artworks **SHALL** support the architectural concept developed for the transit facility.
- Maintenance needs of artworks **SHALL**, in general, be consistent with the maintenance needs of the particular transit facility and site.
- Transit facility artwork **SHALL** work with the existing ambient lighting of the facility wherever possible. Special lighting requirements **SHALL** be identified on a site-specific basis and **SHALL** be accommodated within the site planning as early as possible.

- Other special needs **SHALL** be assessed on a site-specific basis and **SHALL** be identified within the site planning as early as possible.

- Materials, fabrication methods, and installation methods should be appropriate for the life-cycle of the facility in which it is installed.

2.4 Transit Oriented Development (TOD)

At some Sound Transit facilities, transit oriented development (TOD) or joint development opportunities may be feasible. Designers should follow applicable Board policies and guidelines that focus on facility operations, project scope, budget, schedule, and local community participation: Motion M98-25, Motion M99-60, and Resolution R99-35. Any consideration of TOD **SHALL** be coordinated with Sound Transit's Real Estate staff, and particularly with the TOD manager.

2.5 Security/Safety

Security and safety concerns are being addressed in design standards and guidelines throughout this manual. For example, in Chapter 3, Section 3.7 identifies the application of Crime Prevention through Environmental Design principals to enhance site security. Also, Section 13.3 of Chapter 13 identifies guidelines relating to closed circuit television at selected facilities to provide visual monitoring of facilities through a central location.

The designer can also identify other approaches that can enhance security at a site and elements at the site. For example, there could be approaches relating to lighting within the facility and/or along access paths that could enhance overall security. These approaches **SHALL** be discussed with Sound Transit staff before any detailed design effort is carried out.

2.6 Sustainability

Consideration of sustainability-related design approaches **SHALL** be done in the context of Sound Transit's Environmental Policy. This policy is as follows:

Sound Transit is committed to the protection of the environment for present and future generations as we provide high capacity transit to the Puget Sound Region. Sound Transit has been a catalyst and model for engaging federal and state partners to resolve environmental issues that apply to our program. We will continue to be an environmental leader in the State of Washington through the integration of the following principles into our daily business practices:

- We will be in full compliance with all environmental laws and regulations. We will strive to exceed compliance by the continual improvement of our environmental performance through cost-effective innovation and self-assessment.

- We will restore the environment by providing mitigation and corrective action, and will monitor to ensure that environmental commitments are implemented. We will improve our ability to manage and account for environmental risk.

- We will avoid environmental degradation by minimizing releases to air, water, and land. We will prevent pollution and conserve resources by reducing waste, reusing materials, recycling, and preferentially purchasing materials with recycled content.

- We will increase the awareness of environmental issues among agency employees through education and training. We will continue to educate the public about the environmental benefits of our transit system. We will build relationships with our contractors, vendors, consultants, and transit partners during planning, design, construction, and operation to protect and enhance the environment.

- In order to implement this Policy, Sound Transit will establish and maintain an Environmental Management System (EMS) with environmental objectives and targets that are measurable, meaningful, and understandable. The goals and progress of this Policy and the EMS will be communicated to agency board members, officers, employees, and the public.

Throughout the following chapters, this manual provides guidelines for incorporating sustainability into transit facility design. For example, designers **SHALL**:

- Design buildings and systems to maximize energy efficiency.

- Use low-emitting paints, sealants, adhesives, carpets, and composite wood products in design specifications.

- Include bike racks and/or lockers in station design.

- Design facilities to include the use of non-polluting and renewable energy, such as solar photovoltaic, wind, geothermal, low-impact hydroelectric, biomass, and bio-gas strategies, and to take advantage of net metering with the local utility.

- Incorporate sunlight into the design to reduce heating needs in the winter and lighting needs.

- Integrate recycled materials into the design.

- Avoid the use of non-renewable raw and long-cycle renewable materials, and instead use more rapidly renewable materials.

- Incorporate natural ventilation into the design where possible to conserve energy.

- Design buildings to include an area to collect and store recyclables.

- Consider reusing existing buildings or elements of existing buildings, with updates of outdated components.
- Consider incorporating salvaged materials into building design.
- Design stations to include "green roofs" for drainage and temperature control.
- Incorporate low emissivity (low-E) glass into the design to allow light to enter while also providing thermal insulation.
- Maximize water efficiency in the design to reduce the burden on municipal water supply and wastewater systems.

Chapter 3 – Site Layout

A functional site layout is critical to the successful operation of a transit facility. In particular, the transit facility **SHALL** be located so that it is accessible to the community, and it **SHALL** be designed so that transit vehicles and customers can easily access it. This chapter presents standards and guidelines for the following layout-related elements:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

3.1 Connection to the Community

Each facility should not only be a component of the transit system, but contribute to the quality of the neighborhoods and community of which it is a part. Facilities **SHALL** be developed using components that are interchangeable throughout the system while also allowing for the individual character of each neighborhood or community to emerge in the facility's design.

The following are overall guidelines that provide design direction for connecting transit facilities with the communities they serve:

- Recognize the importance of context in the facility's design. Key goals to be considered are:
  - Represent the transit system (service and facilities) from the standpoint of Sound Transit's customer experiences.
  - Identify means of access and off-site improvements, consistent with the overall design program identified by Sound Transit for the facility.

    - Within overall facility design, provide a context that recognizes nearby developments.
- Provide direct paths between the boarding area and adjacent streets (with features such as well-lit walkways and wayfinding signs).

- Coordinate with local jurisdictions to develop the site layout with consideration of existing and planned roadways and pedestrian and bicycle routes.

3.2 Access

A variety of access modes are anticipated for each Sounder and ST Express facility. This section describes direction regarding design features for these modes.

3.2.1 Pedestrian Access

The following are design guidelines relating to pedestrian access at Sounder and ST Express passenger facilities:

- Walkways **SHALL** be provided to accommodate normal paths of pedestrian travel through the station. Pedestrian circulation routes **SHALL** provide direct and convenient approaches to transit center and station entrances, if provided, from off the site and from individual sections of parking.

- The site layout **SHALL** be developed in a manner that eases wayfinding within the site as well as between the site and adjacent areas.

- Pedestrian access **SHALL** address potential security concerns, both actual and perceptual, as well as comfort/convenience. For example, lack of visibility between waiting areas and nearby activities may result in perceptual concerns about security.

- Sidewalks **SHALL** be provided connecting the station building, platforms, elevators, access/egress points, drop-off/pick-up areas, parking areas, bus stops, and local/municipal sidewalks/walkways surrounding the general station area.

- Parking aisles in park-and-ride lots **SHALL** be designed to consider pedestrian needs and safety, as well as lot capacity. Pedestrian movements within park-and-ride areas will normally occur within the drive aisles. However, pedestrian walkways may also be required to minimize vehicular interference, to reduce the number of points where pedestrians cross aisles, and/or to shorten irregular routes through successive aisles. Where practical, speed bumps may be considered to reduce vehicle speeds for pedestrian safety.

- Sidewalks next to the platforms **SHALL** be provided when parking is adjacent to the platform and a sidewalk is required to provide the separation of pedestrians from the auto traffic. Sidewalks also provide a means of protecting the platforms from automobile damage.

- Pedestrian walkways **SHALL** be adequately lighted for safety. (See Chapter 12 – Lighting Elements).

- All sidewalks and curb cuts **SHALL** conform to ADA Guidelines.

- The width of pedestrian walkways **SHALL** be as follows:

    - Walkways through bus stop areas **SHALL** be a minimum of 7 feet - 2 inches; however, 12 feet is preferred.
    - Walkways adjacent to long-term parallel parking **SHAL**L be a minimum of 6 feet; however, 12 feet is preferred.
    - Walkways adjacent to short-term parallel parking **SHALL** be a minimum of 7 feet - 2 inches; however, 12 feet is preferred.
    - All other walkways **SHALL** be at least 5 feet – 0 inches wide.
    - Within the facility, crosswalk width should be a minimum of 10 feet; however, 12 feet is preferred.

- The following additional design standards **SHALL** be adhered to:

    - Steps or abrupt changes in level in walkways **SHALL** be avoided (as required by ADA).
    - Layout of walkways **SHALL** provide maximum visibility of and by oncoming vehicular traffic. Avoid routing walkways adjacent to columns or walls that will reduce pedestrian visibility to vehicle operators.
    - Crosswalks **SHALL** be marked and be clearly visible to motorists.
    - Crosswalk materials **SHALL** be noticeably different in terms of color and/or texture to clearly indicate where the crossing should occur.

- Pedestrian access **SHALL** be given highest priority in design and operation of facilities.

- The designer should recognize any planned and existing pedestrian and bicycle routes within one-quarter mile of the station. Connections between these routes and the facility should be identified in the design of access.

- Facility design **SHALL** also accommodate bicycle access. Section 4.4 of Chapter 4 – Parking provides information on bicycle parking at Sounder and ST Express facilities.

3.2.2 Vehicle Access Hierarchy

Sound Transit customers could arrive or depart from transit facilities by modes of travel listed below. The following order of priority for providing convenience and directness of routing **SHALL** be used by the designer.

1. Pedestrian

2. Link light rail, Sounder commuter rail, ST Express bus, local transit, including paratransit services;
3. Accessible parking
4. Bicycle/Passenger drop-off
5. CarShare/VanShare and Carpool/Vanpool
6. Motorcycle/Scooter & Private Shuttle/Taxi
7. Passenger vehicles (park-and-ride)

The layout of transit facility sites, as well as associated access roadways, should ensure that provisions are made for access by patrons in all the above classifications where applicable.

For vehicle (including bicycle) parking design standards and guidelines, see Chapter 4.

3.2.3 Vehicular Access to Park-and-Ride Facilities

The design of vehicular access points at park-and-ride facilities should take into consideration adjacent land uses and avoid large unplanted or paved areas that are out of scale with those uses. Curb cuts should be minimized, while fulfilling the following:

- Customer wayfinding should be emphasized both through signage and through design response to the facility's context.

- Due to relatively high speeds and traffic volumes, vehicular access directly from major highways/arterials into a park-and-ride facility should be minimized. Instead, if feasible, either minor arterials or streets designated for transit service (usually non-residential streets) should be used for access.

- Vehicular access from local residential streets should be avoided.

- Site layout and facility design features should allow for potential management of access. (Chapter 4 – Parking further describes potential management of parking).

- Access roadways to transit facility sites should be designed to contain sufficient traffic storage capacity to meet expected transit patronage at peak times and to prevent traffic backing up onto public streets.

- Conflicts should be avoided between access roadways, bicycle access, and pedestrian access points.

3.2.4 Design of Internal Circulation Routes

The design of internal circulation routes **SHALL** be governed by the following design standards and guidelines:

- Roadways intended to provide access to bus zones, park-and-ride stalls, and passenger drop-off areas **SHALL** be designed in accordance with local codes and

the "AASHTO Policy on Geometric Design of Highways and Streets," as supplemented and modified in these criteria.

- One-way traffic operation on such roadways should be provided if adequate right-of-way is available.
- Provisions for passing a stalled vehicle should be made along roadways exiting from public streets.
- Bus movements should be separated from automobile access and driveways as much as possible.
- Major pedestrian movements should be separated from motor vehicle circulation to the greatest extent possible.

3.2.5 Emergency Access

Access for emergency response by fire department and paramedic equipment/personnel, **SHALL** be provided, consistent with local codes.

3.3 Location of Boarding Platforms and Bus Zones

This section identifies design standards and guidelines for locating Sounder platforms and ST Express bus zones. Direction relating to more specific design characteristics of these facilities is provided in Chapter 5 of this manual.

3.3.1 Locating Sounder Station Platforms

Sounder station platforms **SHALL** be located immediately adjacent to the railroad tracks. The location of station platforms should also meet the following guidelines:

- Platforms should be located near existing at-grade crossings to reduce the need for grade-separated pedestrian crossings.
- Platforms should be located to allow convenient access by customers who are walking and bicycling.
- Platforms should be located near major bus routes to allow convenient access by buses to the stations while avoiding major additional operating costs to bus operators.
- Platforms and transit facilities should be visible from arterial streets and nearby activity areas to increase the visibility and personal security of waiting patrons.

3.3.2 Locating ST Express Bus Zones

Bus zones for ST Express bus service can be provided at several types of transit facilities, including:

- Individual on-street bus stops, usually shared with local transit providers or transit partners.

- Stand-alone transit centers, such as the Bellevue Transit Center.

- Transit centers co-located with Sounder stations, such as the Kent Sounder station.

- Passenger boarding areas co-located with park-and-ride facilities, such as the Federal Way Transit Center, which includes a structured park-and-ride garage.

This manual presents standards and guidelines primarily for bus zones located at transit centers, park-and-ride facilities, and Sounder stations.

Following are standards and guidelines for locating ST Express bus zones:

- Bus zones **SHALL** be placed to minimize patron travel time (bus and walk time).

- Patrons should move safely and efficiently through the facility. A one minute travel time between buses and park-and-ride facilities or between buses and Sounder platforms is the goal. At a walking speed of about 3 feet per second the maximum transfer distance should not exceed 200 feet. However, site constraints will frequently dictate greater transfer distances.

- Where buses will circulate within the site, curb radii, etc., designs **SHALL** conform to the bus turning templates shown in Appendix B. Light poles, bollards, fire hydrants, and other fixtures **SHALL** be placed at least four feet back from the curb edge to prevent buses from striking them with their back end when pulling out.

- Bus zones **SHALL** provide a safe and accessible place for patrons to board and disembark from buses, as well as a place where buses can efficiently operate. Bus zones **SHALL NOT** be located in areas where buses make tight turns, because the ends of buses may overhang the curb line during turns.

- Bus zones should be located with easy access from freeway and arterial bus routes to minimize out-of-direction travel.

- Bus zones should be visible from arterial streets and nearby activity areas to increase the visibility and personal security of waiting patrons.

- Location of bus zones should be flexible and designed to accommodate potential future growth.

- Bus zones should reinforce safe pedestrian movements and easy vehicle operation.

- As much as possible, all zones should be located in a common area within the facility.

3.4 Location of Bus Boarding Zones at Freeway Stations

Bus zones at freeway (in-line) stations are located adjacent to highway ramps to minimize out-of-direction travel. Because these stations are located in WSDOT right-of-way, designers **SHALL** work closely with WSDOT when planning or designing freeway stations. See WSDOT's HOV Direct Access guidelines in WSDOT publications list.

Designers should keep several considerations in mind in locating bus zones at freeway stations:

- Pedestrian circulation routes **SHALL** provide direct and convenient approaches to freeway station boarding zones from adjacent streets, local bus zones, and park-and-ride lots. These pedestrian routes should be as short as possible and in some cases may be covered to provide weather protection.

- Bus zones should be visible from arterial streets and nearby activity areas where possible to increase the visibility and personal security of waiting patrons.

- When designers configure freeway stations in the median, they should consider the following:

    - Use of right side of transit-only roadway for proper access to bus doors
    - Use of a central platform, which would require reverse access (English style) at the station or alternative technology buses with doors on the left side.

Designers need to consider safe pedestrian access to and from the platform, especially if access requires pedestrians crossing the bus travel lanes. This crossing opportunity could be vertical access (e.g. an elevator), which may be more suitable for a central platform or a surface crossing.

If a surface level crossing is used, safety features such as flashing lights imbedded in the roadway and traffic controls for buses entering the station areas should be considered.

Freeway station design should consider passenger comfort and security, including efforts to reduce nearby freeway noise. Also, shielding features should be provided to protect riders from debris coming from the freeway and, where feasible and appropriate, from wind and rain.

If the design includes a pedestrian bridge connecting the freeway station to the park-and-ride lot or other facility, the roof **SHALL** be designed to drain away from the roadways. These pedestrian bridges **SHALL** include continuous kick plates to prevent debris from being kicked onto the roadway.

3.5 Location of Park-and-Ride Facilities: Surface and/or Structure

Park-and-ride facilities should be located as close as possible to major streets and freeways serving a site. For vehicle access by customers, see Section 3.2.3 of this chapter.

Where possible, the maximum distance between the farthest stall of the park-and-ride lot and the boarding area should be ¼ mile. The design should provide unobstructed sight lines between all areas of the park-and-ride lot and the boarding areas wherever possible. Connections between the park-and-ride area and station boarding areas should be as direct as possible and include walking paths connecting to the boarding areas. To assist the wayfinding experience of customers, these paths should generally be lit at a higher foot-candle level than surrounding parking area.

3.6 Location of Communications and Electrical Rooms/Buildings

At bus facilities, communication and electrical buildings should be located near parking designated for service vehicles. For Sounder facilities, these buildings should be located as close as feasible to the tracks. Any communication and electrical buildings should be either located away from bus zones (to avoid collisions) or be protected by bollards if a remote location is infeasible.

As a security measure, non-public facilities such as the communications and electrical room/building should be located away from passenger areas (where feasible) and not identified with signage.

3.7 Applying Security Principles

Several security principles can be applied to a facility's design. Application of Crime Prevention through Environmental Design (CPTED) principles should be used to enhance site security. The central principle of CPTED is the creation of *natural surveillance,* developed in the planning and design of a facility, that creates an active and therefore safer, public realm.

Where feasible, designers should incorporate the following CPTED principles into facility designs:

- Natural surveillance
- Natural access control
- Territorial reinforcement

Through natural surveillance, passengers, staff, and other legitimate users of the facility can easily observe all areas. For example, station boarding platforms could be located

within eyesight of the main thoroughfare and nearby businesses that are operating during transit service hours.

Natural access control is a design strategy that is directed at decreasing opportunities for crimes to be committed by reducing or eliminating perpetrators' access to potential victims.

Territorial reinforcement is used to create or extend a sphere of influence so that users of a property develop a sense of proprietorship over it. Territorial reinforcement strategies will often include natural surveillance and natural access control strategies.

The facility design should avoid locating sensitive facilities (e.g. major communications equipment) near public areas. Also, the designer should avoid visual clutter and blocked sightlines on boarding platforms.

The passenger facility designs should provide lighting in structured parking consistent with applicable codes. Doors that need to be secured should lock from both inside and outside.

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Chapter 4 – Parking

Public parking at some Sound Transit facilities may be necessary to provide adequate access for customers. In 2002, the Sound Transit Board approved Motion M2002-122, establishing policies to define and regulate the uses that are permitted, and those that are prohibited, at Sound Transit's parking facilities. The design, layout, and ultimate use of parking facilities **SHALL** be consistent with these policies (Board Motion M2002-122). Local codes also **SHALL** be considered to help ensure acceptance of design and layout of parking facilities.

Facility design should include features that will allow potential future parking management at the site. Section 4.6 of this chapter provides further information on potential parking management that could occur at a site.

The design of parking facilities should also recognize potential expansion that may occur. One key consideration includes identifying locations for a temporary park-and-ride lot while expansion takes place.

Chapter 4 presents standards and guidelines for the following parking elements:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

4.1 Park-and-Ride Facilities

Park-and-ride stalls will be provided at selected transit facilities as determined by Sound Transit. Park-and-ride facilities fall under two major categories: surface lots and structured garages. The South Sammamish Park-and-Ride is an example of a surface lot while the parking garage at the new Federal Way Transit Center is an example of a structured lot.

While most park-and-ride lots in the central Puget Sound region are surface facilities, any new parking facility with over 500 stalls should be in a structure. Also, any expansion of

existing park-and-ride facilities that results in a net total of more than 500 stalls should include a structured facility.

The following describes design standards and guidelines for park-and-ride lot facilities:

4.1.1 Characteristics of Park-and-Ride Facilities

- Unless otherwise dictated by local codes, vehicular stalls **SHALL** be 7.5 feet wide for compact vehicles, 8.5 feet for standard vehicles, or as negotiated with the local jurisdiction. Stall depth **SHALL** be 16 feet deep for compact vehicles and 18 feet for standard vehicles, in 60-foot bays. For stalls located against a curb, the stall depths indicated above may be reduced by two feet as long as this does not reduce planting areas. Designs utilizing stalls at 90 degrees to the drive aisle are preferred for efficiency.

- Where feasible and given site constraints, parking lots **SHALL** be designed so as to avoid the use of earth-retaining structures.

- Where feasible and given site constraints, construction work **SHALL** be kept within Sound Transit's rights-of-way.

- Curbs **SHALL** be provided at all parking lot edges constructed on fills more than five feet high, while guard rails should be considered on fills higher than 10 feet.

- Borders adjacent to curbs or guard rails should be wide enough for landscaping and planting, subject to local jurisdiction requirements for storm water management and critical areas.

- The parking lot **SHALL** be appropriately illuminated. See Chapter 12 for further information on lighting.

- Parking layouts **SHALL** follow guidelines identified in Chapter 3 – Site Layout, subject to negotiations with local jurisdictions.

- Parking garages **SHALL** be "open" structures, as defined by and in accordance with the requirements of the Washington State Building Code/IBC, unless infeasible due to site conditions or constraints (e.g. due to costs or impacts on sensitive areas such as wetlands).

- Since parking garages will be "open" as defined by IBC, they will not require sprinklers (see WAC 51-50 Section 903 — Automatic sprinkler systems).

- Floor-to-floor heights of garages **SHALL** be a minimum of 10 feet (10.5 feet preferred for standard parking) and a minimum of 12 feet for ADA van accessible levels (nearest to entrance and exit and the level of the garage with a direct connection to the pedestrian bridge, if possible).

- Minimum clearance on each floor of the garage **SHALL** be 7 feet, 2 inches on standard levels and 8 feet, 2 inches on open levels for ADA van accessible stalls.

- Whenever possible, columns should be located between adjacent rows of stalls, along the front bumper of cars. These columns should preferably maintain a clear span between 56 to 60 feet, to accommodate two parking stall rows and a drive aisle between them.

- Parking garages **SHALL** be illuminated in accordance with the standards identified in Chapter 12 – Lighting of this manual.

- Parking garage gates **SHALL** be made of steel. Electronically operated gates **SHALL** have a bottom bar with integral locks that are hard wired to a keyed switch that will not operate until the bar is unlocked. The keyed switch **SHALL** be capable of stopping and reversing part way through an opening or closing cycle.

4.1.2 Vertical Circulation

- Elevators and stairs **SHALL** be provided for passenger access to the ground from parking floors.

- Stair towers and elevators **SHALL** be appropriately located on or adjacent to station platforms, with a sufficient number of egress stairs provided to meet the Washington State Building Code of requirements.

- Stairways **SHALL** be designed to provide minimum overhead clearance of 10 feet measured perpendicular from the nosing of the stair tread to any overhead obstruction for headroom along the stairway.

- Some parking garages **SHALL** be connected to other elements of a passenger facility through pedestrian bridges. Section 5.3 of Chapter 5 – Public Areas provides further information on pedestrian bridges.

4.1.3 Access at Park-and-Ride Lots

- Vehicular access to and from the lots **SHALL** minimize interference with street traffic.

- To reduce impacts on local streets, primary access to park-and-ride lots should be from major streets (although avoiding high-speed arterials if possible). Secondary access points may be from major or minor streets.

- Access locations should minimize potential vehicle and pedestrian conflicts.

- Wayfinding signage to and within the lot **SHALL** be provided. Section 2.2 of Chapter 2 – Integrated Programs and Initiatives provides further direction regarding wayfinding signage.

- Vehicle entrances and exits **SHALL** occur away from street corners. Parking lots **SHALL** be configured to provide access for emergency vehicles, including fire equipment and ambulances in the event of an emergency.

- Fire lanes **SHALL** be clearly marked on the pavement.

- Further guidance on access to parking facilities is included in Section 3.2.3 of Chapter 3 – Site Layout.

- Wayfinding signage to and within the facility **SHALL** be provided at parking garages. Section 2.2 of Chapter 2 – Integrated Programs and Initiatives provides further direction regarding wayfinding.

- Other characteristics of site access are identified in Section 3.2 of Chapter 3 – Site Layout.

4.1.4 Accommodating Technology at Park-and-Ride Facilities

Chapter 13 – Communications and Technology provides further information on accommodating technology at passenger facilities. The following sections identify design standards to address potential technology at park-and-ride facilities.

- A closed circuit television (CCTV) system and Customer Emergency Stations (CES) **SHALL** be installed on all floors of multi-level parking garages.

- Surface park-and-ride lots will likely involve smaller areas and fewer obstructed sight lines than parking garages. In general, CCTV and CES **SHALL NOT** be installed at surface park-and-ride lots unless warranted by site-specific conditions (such as obstructed sight lines).

- Conduit capacity for future technology (e.g. fiber optics) **SHALL** be provided for in the parking garage's design.

4.1.5 Sprinklers

As determined by IBC and IFC, fire suppressant sprinkler systems **SHALL NOT** be installed in parking garages that meet IBC definition of an *open* structure.

4.2 Parking for Persons with Disabilities

Accessible parking **SHALL** be provided at all facilities where parking is provided, in accordance with requirements of ADA and state building code.

- Accessible stalls **SHALL** be provided near transit facility boarding areas and in conformance with the ADA requirements (see Section 2.1 of Sound Transit's Accessibility Guidelines). [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

- Continuous smooth surface ramps without vertical rises and maximum slope of 1:12 **SHALL** be provided from the accessible parking area to sidewalks and station entrances. Ramp slopes of 1:20 or less are preferred so as to avoid need for handrails.

4.3 Motorcycle/Scooter Parking

Motorcycle/scooter parking stalls should be provided at park-and-ride locations, consistent with the following guidelines:

- The designer **SHALL** consider local codes for motorcycle/scooter parking.
- Motorcycle parking stalls should be added in spaces created by the site layout that would otherwise not be used.
- Stall sizes should be 4 feet by 8 feet with maneuvering lanes of at least 10 feet in width.

4.4 Bicycle Storage/Lockers

Bicycle storage for a minimum of 12 bicycles **SHALL** be provided at all transit center or rail station locations, or a greater number as determined by Sound Transit. Designers should reference Sound Transit Board Motion M98-78 (Appendix A within the motion) for overriding policies. Section 10.4.8.4 of this manual provides further direction regarding furnishings for bike storage and lockers.

The designer should consider local codes for bicycle storage; however, these facilities **SHALL** conform to the following basic requirements:

- Bicycle storage facilities **SHALL** be constructed on hard surfaces, and space for future expansion **SHALL** be included in the design.
- Storage facilities **SHALL** be located for easy access to facility entrances and the street system.
- Conflicts with pedestrians, station access/fare collection and bus boarding **SHALL** be avoided.

- Bicycle facilities **SHALL** be given preference over motorcycles as to location.
- A secure stanchion **SHALL** be provided to allow bicycles to be locked and/or bicycle lockers **SHALL** be provided for protection from vandalism.
- A sign designating the location of the bicycle storage area **SHALL** be provided.

- Bicycle storage areas **SHALL** be properly lighted. Chapter 12 – Lighting Elements provides guidance on lighting.

- Bicycle storage facilities **SHALL** be located in covered areas.

- In design of bicycle storage facilities, consider security issues and applicable regulations (visual transparency/opacity of bicycle lockers, etc.).

4.5 Potential Future Parking Management Systems

Currently, Sound Transit park-and-ride facilities are free for transit riders as well as carpool/vanpool users. As the agency matures and demand for parking grows, Sound Transit may consider parking management systems for its parking facilities.

The following sections further describe current design considerations for potential future parking management systems:

- The design of parking facilities **SHALL** accommodate potential future parking management systems. Consideration should be given to the number, size, and location of ingress/egress points (including access drives for vehicle queuing).

- Designers should consider physical space and potential conduit needs that would be required for traffic loop sensors, traffic gates, and antennas in order to implement a gate cashiering, "pay on foot", Smart Card, conventional multi-space meter, or other revenue collection systems.

- The types of potential management approaches at parking facilities should include but are not limited to:

    - Distinguishing between car/vanpools that bring riders to transit and car/vanpools that meet at a transit center to drive to another location. The former would get preferential parking location; the latter should use the facility only if not displacing riders of modes serving the transit center.
    - Provisions for different levels of commitment to public transit via monthly pass, etc. For example, stalls could be reserved for pass holders.
    - Provision for guaranteeing a stall at the facility if the customer pays. The lot would still be free to other users but a stall would not be guaranteed.

4.6 Passenger Drop-off Areas

Passenger drop-off areas are set aside for automobile drivers to allow both pick-up and drop-off of transit customers. Parking at these locations **SHALL** be short-term only; no more than 10 minutes.

On-street passenger boarding zones and/or private shuttle/taxi drop-off should also be provided at facilities as determined by Sound Transit. Location of drop-off areas should

be consistent with the following guidelines and with code requirements of the local permitting authority:

- Passenger drop-off, or short-term parking, should be provided in close proximity to the platform or station, and separate from transit vehicle routes.

- For Sounder stations, the location for passenger drop-off facilities should be within view of the platform(s) or entry points to the platform(s).

- Convenient recirculation of passenger drop-off vehicles should be provided in the event that short-term parking stalls become filled.

- Designers should avoid routing passenger drop-off vehicles through the park-and-ride areas wherever possible.

- If drop-off areas are provided in a park-and-ride lot or garage, placement should avoid conflicts with entering and exiting traffic.

- Stalls and aisles for passenger drop-off areas should be larger than those in long-term parking areas due to the frequent turnover of short-term parking, provided that the required number of regular parking stalls is not reduced by providing these stalls.

- Preferred parking arrangements for passenger drop-off areas are as follows, in order of preference:

    1. Parallel to curb
    2. 45 degrees to the drive aisle
    3. 60 degrees to the drive aisle
    4. 90 degrees to the drive aisle

- Parking stalls parallel to the curb should be 10 feet wide and 21 feet long except that beginning and ending stalls may be 20 feet.

- Pedestrian crosswalks should leave a minimum of 20 foot zones on either side of parallel parking stalls.

- The area should be designated with a sign indicating that it is for passenger pick-ups and drop-offs with time limits as in the example to the right.

4.7 VanShare and CarShare Parking for Transit Riders

Where appropriate, reserved parking stalls for VanShare or CarShare vehicles should be provided for people who, 1) arrive at a station on Sound Transit buses and trains and 2) depart using these same vehicles. The provision of these stalls should be governed by the following standards:

- Initial planning and environmental assessment for the facility **SHALL** indicate the need for these stalls, if any.
- The stalls **SHALL** be located close to boarding platforms.
- The designer **SHALL** consider local codes for VanShare and CarShare parking.

4.8 Vanpool and Carpool Parking for Transit Riders

When appropriate, reserved parking stalls should be provided for people who arrive in vanpools and carpools and then board ST buses and trains. The provision of these stalls should be governed by the following standards:

- Initial planning and environmental assessment for the facility **SHALL** indicate the potential need for these stalls, if any.
- The stalls **SHALL** be located close to boarding platforms.
- The designer **SHALL** consider local codes for vanpool and carpool parking.

4.9 Private Shuttle/Taxi Parking

Where appropriate, stalls should be provided for private shuttles and taxi drop-offs. These stalls should be designed with the following guidelines in mind:

- Stalls **SHALL** be located close to boarding platforms.
- Stalls **SHALL** be marked as "Private Shuttle/Taxi" only.
- The designer **SHALL** consider local codes for private shuttle/taxi parking.
- There could be some potential for sharing the passenger drop-off areas (see Section 4.6) with the private shuttle/taxi parking, as long as there will be sufficient space for passenger pick-up and drop-off, and as long as it is marked as a shared stall.

Chapter 5 – Public Areas

Because nearly all areas of a transit facility are used by the public, designing the facility to be customer-friendly is essential. This chapter presents standards and guidelines for the design of the following types of platforms and customer amenities:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

5.1 Platform: Sounder Commuter Rail Stations

This section provides direction for public areas at Sounder facilities. The description includes applicable clearances, platform surfaces and edges, and platform geometrics. Appendix A provides examples of drawings for various station characteristics. Most of the drawings are from the Sound Transit Station Design Manual prepared in 1998[3]. It should be noted that these drawings are for **illustrative purposes only** and shall not be regarded as suitable for construction.

5.1.1 Applicable Clearances

Appendix A, Exhibits A-1 through A-8, provides examples of drawings relating to platform clearances, surface/edge features, and geometrics. The designer **SHALL** comply with BNSF/UP, WUTC, and Sound Transit clearance standards. Sound Transit clearance requirements, as described in Sound Transit's Track & Signal Design Criteria, are noted below. The designer however, should follow BNSF standards unless otherwise directed by Sound Transit's project manager. The designer **SHALL** confer with appropriate Sound Transit Capital Projects staff to review relevant standards identified by BNSF.

[3] Sound Transit Station Design Manual (November 1998)

BNSF requires a dynamic envelope or zone of clear passage that must be clear of all posts, canopies, signs, handrails, or other physical obstacles. Lateral clearances are wider on curved track. However, platforms for passenger service **SHALL NOT** be located on a curved track section unless tangent track is unavailable at the station site selected.

The designer **SHALL** calculate the clearance based on the curvature and super elevation of the track if any. Platform elevation at 8" above top of rail and platform edge at 5'-4" from centerline of tracks comply with BNSF Standards.

Sufficient handrail clearances SHALL be provided in the station design. Appendix A, Exhibit A-8 provides an example of a drawing for handrail clearances.

The designer **SHALL** also recognize and address requirements included in Sound Transit's Accessibility guidelines, particularly Sections 6.1 through 6.6. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

5.1.2 Sounder Platform Surface and Edge

The platform surface material should be compatible with architectural features of the facility while also being economical to construct and maintain, and safe for passengers. Double-pour (concrete), or topping slabs, **SHALL NOT** be permitted.

Sounder platforms **SHALL** slope away from platform edge, increasing safety for customers using wheelchairs or other mobility devices.

All platforms **SHALL** have a 24-inch wide band of tactile warning tile, located along the track-side edge of durable slip-resistant material. The tile **SHALL** be muted yellow in color (see Section 10.4.6.2). The tile **SHALL** have a surface texture composed of raised truncated domes in an orthogonal pattern with the following dimensions:

- A diameter of nominal 0.9 inch at the base
- Tapering to 0.45 inch diameter at the top,
- A height of nominal 0.2 inch, and
- A center-to-center spacing of nominal 2.35 inches.

Nominal, as referenced above, **SHALL** be in accordance with the ADA. The design of the platform's surface and edge **SHALL** be in compliance with the ADA.

Appendix A, Exhibit A-9 (Drawings 4 and 9) provides example drawings of tactile warning surface details.

5.1.3 Sounder Platform Geometrics

Dimensional requirements for station platforms are established by either the fire/life safety (FLS) requirements, wayfinding provisions (e.g. paths located between the

platform and other locations at the facility), or by the day-to-day passenger requirements as established in this chapter. Where calculations under the two methods lead to different numbers, the more stringent **SHALL** control (most often, the larger dimensions). For day-to-day operations, the platform **SHALL** be sized to comfortably accommodate the predicted number of patrons on the platform comfortably under normal operating conditions. Both boarding and alighting loads **SHALL** be considered in the calculations. For FLS requirements, missed headways and NFPA peak factors **SHALL** be considered. Under severe site constraints, day-to-day patronage requirements can be reduced, as approved by Sound Transit, but FLS safety requirements **SHALL** be met.

5.1.3.1 Configuration and Access

Station platforms can either be of center or side platform type depending on station functional requirements, site constraints, or traffic conditions. However, BNSF discourages center platforms. If a center platform is called for, the designer **SHALL** identify a grade-separated crossing as the only access between the platform and adjacent public areas such as park-and-ride facilities.

Freestanding columns that are within 10 feet of a platform edge **SHALL** be located so as not to coincide with the locations of vehicle doors during station stops to minimize congestion. Columns beyond 10 feet have no restrictions in their placement.

Stair and elevator surge zones **SHALL** be free of any and all obstructions. The elevator surge zone is defined as a 10 feet by 10 feet area in front of the elevator door. The stair surge zone is defined to be 15 feet long (measured from end of handrail) and, where conditions permit, five feet wider in each direction than the stair's width. Floor materials in surge zones **SHALL** be highly slip- and wear-resistant.

Obstructions of passenger and CCTV camera sight lines **SHALL** be minimized.

5.1.3.2 Platform Length

The platform length available for boarding and alighting **SHALL** be at least 600 feet (to accommodate an eight-car train). For stations that are (or will be served) by Amtrak Cascades service, platforms **SHALL** be 1,000 feet in length.

5.1.3.3 Platform Width

Platform widths will vary based on patronage, wayfinding provisions, the configuration of vertical circulation elements, center vs. side platform configuration, and station site considerations. For center platforms, the minimum platform width **SHALL** be 30 feet. For side platforms, the minimum width **SHALL** be 16 feet from edge of platform to the face of station wall or parapet railing.

5.1.3.4 Travel Lanes/Exit Lanes

Sufficient number of travel lanes **SHALL** be provided to allow a passenger to exit a station within a reasonable amount of time. During typical peak period operations, this time should exceed by no more than 30 seconds the time required to make the same journey if no other patrons were present.

The minimum exit provisions **SHALL** be as required by National Fire Protection Association (NFPA) 130 (order latest version of NFPA codes here). The factors indicated, together with ADA requirements, **SHALL** be the basis for calculating normal patron travel and exiting requirements.

5.1.3.5 Mini-High Level Platforms

Mini-high level platforms **SHALL** be provided at each station to allow access to at least one Sounder coach on each train by persons in wheelchairs.

As indicated in Sound Transit's Accessibility Design Standards and Guidelines, the location of mini high-level platforms **SHALL** be consistent throughout the system. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

This consistency is necessary to support a standardized location of the accessible Sounder car within any train. Sound Transit's current standards place the accessible door at the B end of inbound head-in cab car and the outbound tail-end car. This standard requires mini-high platforms to be located at the inbound end of existing low-level platforms.

Appendix A, Exhibits A-10 and A-11, provides example drawings of sections and elevations for mini-high platforms. These examples include both center and side platform configurations. Appendix A, Exhibit A-13 includes an example drawing of position marker signage for mini-high platforms. These examples include both center and side platform configurations.

5.2 Platforms: ST Express Facilities

This section presents design guidelines for boarding platforms at ST Express facilities, including freeway stations and transit centers.

5.2.1 Freeway Stations

Freeway stations are similar to bus stops except they are located within the freeway right-of-way. Because these facilities are within WSDOT rights-of-way, designers **SHALL** work closely with WSDOT on these facilities. The freeway stations have acceleration and deceleration lanes, and in some cases on or off-ramps, designed for safe movement of buses into traffic moving at higher freeway speeds.

The stations accommodate buses traveling the freeway. Freeway stations should be located at the same grade as the main roadway or on a ramp. They reduce total trip time for buses, but they typically result in longer walk times for patrons coming from adjacent parking facilities or local bus stops outside the freeway right-of-way.

Stations located in the freeway medians (in-line stations) can include either side platforms or center platforms. Stations with side platforms generally should include a median barrier between lanes in opposing directions. Exhibit 5.1 identifies a concept for a freeway station with adequate right-of-way for stopping lanes and two through lanes to allow passing of stopped buses.

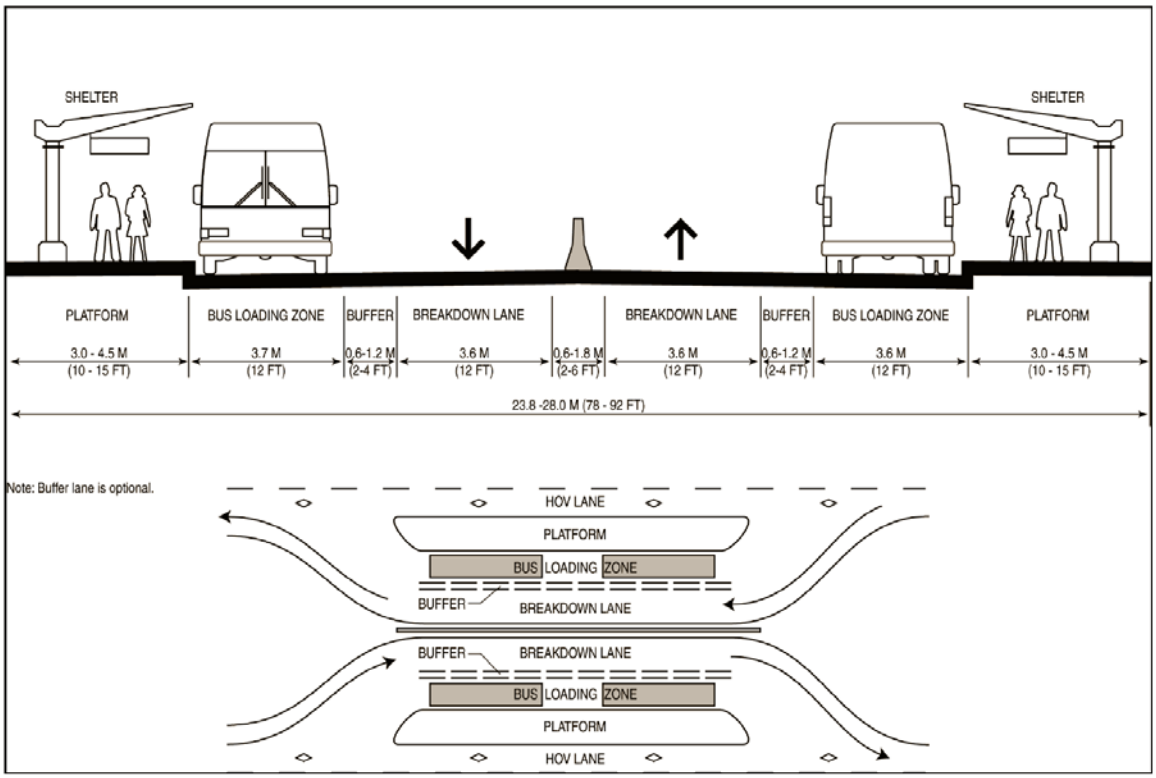


Exhibit 5-1 – Freeway Station Concept with Side Platforms and Bus Passing Lane
(Source: Transit Cooperative Research Project D-09 Transit Vehicles and Facilities on Streets and Highways, Phase II; *Draft Guide* October 2005)

Stations with a center platform require buses crossing to the opposite side to allow bus doors to properly align with the platform.

All station types should include a bypass lane for buses to pass delayed vehicles. If sufficient right-of-way is not available for bypass lanes in both directions, consideration should be given to inclusion of a wide buffer in lieu of a median barrier to allow buses to pass each other in case of a breakdown.

Freeway stations should always include a bus boarding area, sheltered passenger waiting areas, and pedestrian connections (at grade or grade-separated). Stations will likely need to consider park-and-ride and short-term parking (passenger drop-off) nearby and bicycle accommodation. Rarely would a freeway station include restrooms and an ancillary building.

5.2.2 Transit Centers

Transit Centers are facilities that accommodate bus service and customer transfers in a central location with or without adjacent long-term parking. The Federal Way, Bellevue, and Lynnwood Transit Centers are three local examples of transit centers in the Central Puget Sound area, two (Federal Way and Lynnwood) with adjacent parking, one (Bellevue) without.

At transit centers, buses should take no more than 10 seconds to leave the adjacent surface street and reach the boarding location. Buses should be able to rejoin adjacent streets within one minute of leaving boarding location. Signal and signal priority may be required at busier streets or intersections.

Transit centers **SHALL** include a bus boarding area, a passenger waiting area, passenger shelters, and areas for bicycle storage.

Transit centers **SHALL** accommodate bus layover; coordinate with Sound Transit project manager to identify layover requirements. In some cases, transit centers may also include surface or structured parking, ancillary buildings, and restrooms. Rarely, they may also include an operator break room, a supervisor's office, a security office, and a customer service office.

In general, Sound Transit Board policy does not provide for the inclusion of passenger restrooms, but exceptions may be made at high-use facilities where transit partners or other service providers requiring restrooms could maintain them. See Chapter 5, Section 5.6 for further direction on restrooms for passengers and a link to the Sound Transit Board policy on restrooms.

5.2.3 ST Express Bus Zones

Typically, on-street bus zones are provided along major transit routes, but they can also be incorporated into community facilities. Bus stops should always include a bus boarding area and a passenger waiting area. Usually, Sound Transit shares existing bus stops with other transit agencies.

If determined to be necessary by Sound Transit, shelters using the agency's standard design could be located at selected bus zones. For these shelters, designers **SHALL** follow Sound Transit's standard design for bus shelters. Standard drawings and specifications will be made available by Sound Transit's project manager.

5.3 Pedestrian Bridges

In general, pedestrian bridges will only be located, if necessary, at Sounder stations and at freeway stations. Examples include, but are not limited to the following:

At Sounder stations, a pedestrian bridge **SHALL** be provided when passengers are required to cross the tracks to reach the station platform.

- Station with two platforms (separated by tracks)
- Station with a park-and-ride lot located on one side of track and a platform on the other side
- Station with a transit center located on one side of track and a platform on the other side

At ST Express facilities, a pedestrian bridge **SHALL** be provided when passengers are required to cross freeway lanes to reach the station platform.

- Freeway stations located in the freeway median.

Design of pedestrian bridges **SHALL** take into account both the estimated rider demand and the need to minimize costs. The higher surges in demand will likely occur at Sounder stations. However, current examples of pedestrian bridge widths at commuter stations vary widely – from 6 feet at New Jersey Transit stations to 10 feet at Metro North station in the New York City area. To allow for potential demand at Sounder stations, pedestrian bridges should have a minimum width of eight feet. Greater widths may be needed where exceptionally high pedestrian volumes are anticipated, such as in high density urban areas or near sports stadiums (e.g. Weller Street Bridge in downtown Seattle).

Pedestrian bridges **SHALL** be designed to prevent objects falling or being thrown from the bridge onto the roadway or railroad tracks below. If a roof is provided for facilities at Sounder stations, any precipitation **SHALL** be collected and drained away from the tracks. This drainage **SHALL** also have to consider the potential for snow or ice to accumulate and fall onto the roadway or railroad tracks below.

Protective screens **SHALL** be used to prevent vandals from dropping objects from the bridge. Since small objects can be dropped through mesh, a solid screen made from glass or other translucent materials is preferable. The design **SHALL** include provisions for interior and exterior cleaning of protective screens. Finally, continuous kick plates along

the length of the bridge should be considered to prevent objects from being accidentally kicked onto the roadway.

5.4 Vertical Circulation

The following sections describe standards and guidelines for vertical circulation:

- Elevators and stairways **SHALL** be provided in multi-level parking garages at Sounder stations and ST Express facilities.

- Elevators **SHALL** be required to connect pedestrian bridges with platforms or other components of the stations.

- Elevator cab equipment **SHALL** be designed for use by individuals with disabilities. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

- Elevator machine rooms **SHALL** be located as near as possible to hoist ways, but clear of public walking and landing areas.

- Elevators in each station **SHALL** be designated for use by patrons with bicycles.

- Elevators intended for use in moving equipment to and from locations within the facility **SHALL** be sized to accommodate the intended equipment.

- All elevator installations **SHALL** comply with IBC, NFPA, UFC, ADA, and Washington State Accessibility Standards.

- For elevator floors, aluminum, rubber, or other durable, non-absorbent material **SHALL** be used.

- Metal wall cladding, railings, and trim **SHALL** be stainless steel.

- Compartments accessible from inside the elevator cab **SHALL** be located at least four feet above the floor when such placement is not in conflict with other regulations (ADA, etc.).

- Lighting in elevator cabs SHALL be designed using fluorescent fixtures. For further guidance on elevator lighting design, see Section 12.5 of this manual.

- Elevator pit walls **SHALL** be lined with a non-porous material and **SHALL** have a sump pump if gravity drains are not feasible.

- All elevator-operating software **SHALL** allow non-proprietary maintenance and control.

- Both elevator cab and hoist way enclosure **SHALL** be constructed of glass to the maximum extent possible in above-grade stations in order to enhance both actual

and perceived security of the elevator and passengers. Closed Circuit Television (CCTV) camera coverage **SHALL** be provided at each landing.

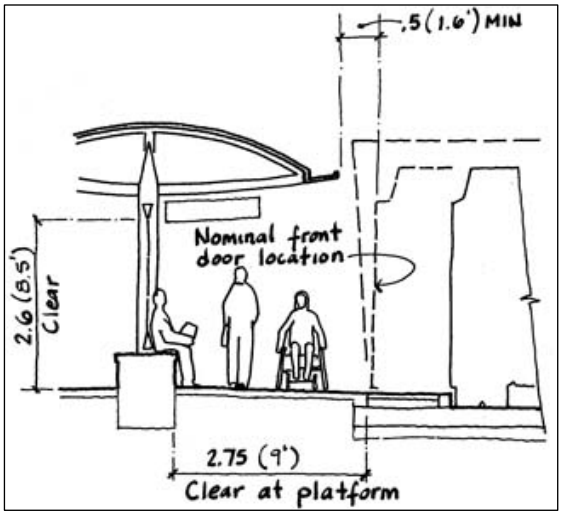
- In addition to meeting all applicable building code requirements, and ADA accessibility design guidelines, the following **SHALL** be incorporated into the design of all public stairs and ramps:
  - Maximum riser height – 7 inches
  - Minimum tread width – 11 inches
  - A cleaning trough of 3 inches in width, flanking the stair treads and risers
- Escalators **SHALL NOT** be provided at ST Express or Sounder facilities.

5.5 Canopies and Windscreens

Though the Puget Sound region's climate is relatively benign and allows for open stations, patrons do need protection from rain, wind, occasional snow, and in some cases, the sun. At a minimum, protection from the weather **SHALL** be provided for the following at:

- Public stairs and approaches to same within 5 feet of termination of hand rails.
- Fare vending equipment including, at a minimum, a four-foot by four-foot area in front of the equipment.
- System map viewing areas and other patron facilities such as public and emergency telephones, etc.

In general, canopy and rain screen design **SHALL** assume that rain is falling at a 10-degree angle from vertical. However, the orientation of a station's platform areas will influence the effectiveness of canopies in providing shade and rain protection. Station orientation **SHALL** be considered in developing canopy and wind/rain screen designs on a station-specific basis. Drip lines **SHALL NOT** be placed over travel pathways or platform edges. At Sounder stations, canopies **SHALL** be designed in a manner that prevents water from draining onto tracks.



To protect patrons from strong wind-blown rain, transparent windscreens **SHALL** be provided on the platforms for a minimum of approximately one-third of canopy coverage. At stand-alone windscreens, the design **SHALL** provide a minimum 6-inch gap at the bottom of framing for ease of cleaning.

5.6 Restrooms for Passengers

ST does not typically install passenger restrooms at transit facilities, although exceptions are sometimes made at high-use stations or multi-modal facilities. Installation of public restrooms at Sounder and ST Express facilities **SHALL** be governed by Sound Transit Board Motion M98-67. However, where operators' restrooms (see Chapter 6, Section 6.1) are provided, space for possible future public restrooms **SHALL** be designated and planned, and utility service **SHALL** be stubbed in.

If restrooms are installed, their characteristics will be based on the following:

- Facilities **SHALL** be accessible in compliance with ADA and state building code requirements. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

- Restroom finishes, fixtures, and equipment **SHALL** meet standards and maintenance requirements set forth by the organization responsible for facility maintenance.

- Facilities **SHALL** include hand air dryers, since they require less maintenance and are less subject to vandalism/theft.

- Facilities **SHALL** include jumbo roll toilet paper dispensers in stainless steel, since they require less maintenance and are less subject to vandalism/theft.

- Hot water heaters **SHALL** be the "on-demand" type. Hot water heaters **SHALL NOT** include holding tanks. Instead, the heaters can be located under the counter (one for each sink or a larger unit placed in a mechanical room similar to a tank unit).

- Sink faucets **SHALL** be automated faucets that turn on as customers pass their hands under them.

- Floors **SHALL** consist of sealed smooth concrete (rather than tile).

- Walls **SHALL** consist of concrete masonry units that are sealed and painted.

- Size of restrooms should be consistent with the number of customers expected to be present during peak commuting hours, to minimize restroom queues.

- Locate entrances for convenient surveillance by security staff and distant from potential hiding places. Closed Circuit Television (CCTV) camera coverage should be provided for restroom entrances.

Restrooms usually include at least one toilet and sink. Restrooms can be segregated by sex or be for individual use by either sex. In public facilities, restrooms should be located in a highly visible location so that criminal activity can be minimized**.** All facilities **SHALL** be fully accessible, and **SHALL** also include fold-down diaper-changing

facilities, in at least one restroom if individual, or one men's and one women's if segregated.

Each restroom **SHALL** have a main shut-off valve accessible by access panel or pipe alley. Hot water **SHALL** be supplied to all toilet rooms. Hot water **SHALL** be supplied by on-demand electric heaters.

Relief valves **SHALL** be provided in accordance with code requirements. Relief valve **SHALL** be piped to indirect waste. Hot water heaters **SHALL** be set to deliver 105° F water.

Thermostatically controlled electric heaters **SHALL** be provided to maintain an interior temperature of 55°F minimum.

The design should result in an exhaust fan discharge with a minimum of 2.0 cfm of air per square foot to an area sufficiently remote so that patrons, nearby residents, and pedestrians will not be offended by odors.

Stainless steel materials and the latest automatic control technologies on fixtures should be used. Stainless steel is the preferred material for fixtures, since it will resist breaking and denting, is fireproof and heatproof, is unmarred by strong solvents, and can be easily cleaned.

5.7 Seating and Benches

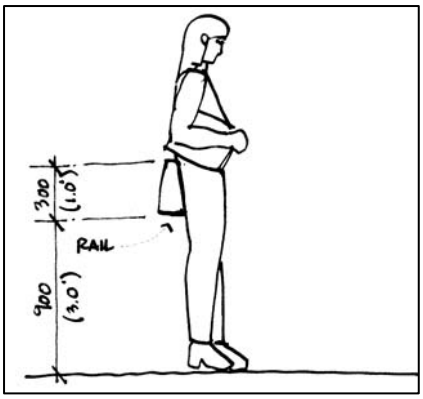
Design and placement of seating and benches **SHALL** follow Sound Transit's Accessibility Guidelines. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.] At bus stops, Sound Transit's standard passenger shelter **SHALL** serve as the design basis. Standard drawings and specifications will be made available by Sound Transit's project manager.

Bus stops at Sounder stations and ST Express facilities **SHALL** have a minimum of six lineal feet of seating per bus bay. One bench **SHALL** be located near each public entry point to the station and arranged so that it does not interfere with patron circulation or emergency exiting. When practical, seating areas **SHALL** be protected from weather by location within areas covered by a canopy. Section 10.4.8.1 of Chapter 10 – Architectural Elements provides further information on furnishings at benches.

Some portion of the platform seating **SHALL** be designed with backs and full-length armrests to facilitate use by persons with disabilities.

At Sounder stations, at least two benches capable of seating four or more people should be provided at each canopy. The exception is the canopy located over the ticket vending machine.

At both Sounder stations and ST Express facilities, benches and/or seating units **SHALL** have design features that will prevent individuals from lying down. Benches and/or seating units **SHALL** conform to ADA requirements. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.] In addition, at least one leaning rail, protected by wind screens, should be provided for each bus boarding location. See exhibit for an illustration of a leaning rail. The bottom portion of the leaning rail should be 3 feet from the ground. The rail should be 1 foot in width.



5.8 Static and Real-Time Customer Information

All signage at Sound Transit's facilities **SHALL** follow the agency's System-Wide Signage Design Manual (see Section 2.2). The designer should request a copy of the manual from Sound Transit's project manager. The signage will allow for future updates of system maps and other information as Sound Transit develops its system. Examples include revisions to ST Express routes and extended Sounder service.

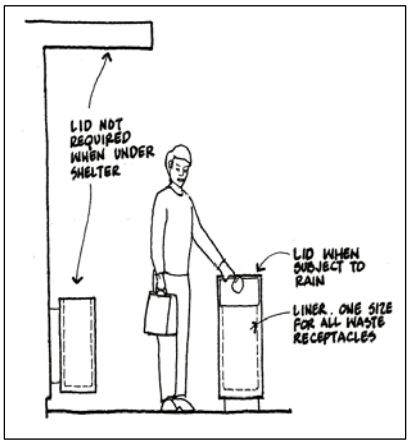
The customer information program should also recognize and address communications elements described in Chapter 13 – Communications and Technology. This chapter addresses real-time information consistent with technology-related standards developed by Sound Transit.

5.9 Waste and Recycling Receptacles

Waste receptacles **SHALL** be installed near passenger boarding areas, but not on platforms. Any recycling containers **SHALL** be located adjacent to waste receptacles.

As indicated in the figure, the waste receptacles should have lids unless placed under a shelter.

Section 10.4.8.2 in Chapter 10 – Architectural Elements, provides further information on specifying waste receptacles.



5.10 Newspaper/Publication Racks

Racks or dispensers for newspapers or other publications **SHALL NOT** be allowed at Sound Transit facilities.

5.11 Ash Receptacles

Ash receptacles **SHALL NOT** be provided on Sound Transit property. If any receptacles are provided outside of Sound Transit right-of-way, they **SHALL** be 25 feet or more from walking paths.

5.12 Advertising

Any advertising at Sound Transit facilities **SHALL** be subject to conditions identified in Sound Transit Board Motion M99-46 unless otherwise superseded by a subsequent Board motion.

Station design **SHALL** identify locations appropriate for advertising based on the following standards.

- Advertising **SHALL** conform to local jurisdictional restrictions.
- The placement or treatment of advertising **SHALL NOT** conflict with, or take priority over, system signing and information.
- Any advertising **SHALL** be carefully located so as not to obstruct, cause distraction, or retard patron movement.
- Advertising **SHALL** be located so as not to conflict with legibility of emergency exits or equipment, particularly at platform level.
- Advertising **SHALL** be placed so that it cannot be easily defaced or damaged.
- Advertising **SHALL** be carefully controlled on all electronic message units that are used for system signing and information.
- Advertising **SHALL** be used as a design element, avoiding haphazard displays.

The format and size of advertising **SHALL** be compatible with available interior or exterior spaces in which it is located, and **SHALL** in all cases be compatible with the architectural expression of the stations.

Location-related guidelines for any advertising are as follows:

- Entry Areas: Station entrances are suitable for advertising as this location is usually free of safety concerns related to trains or vertical circulation. The placement of advertising in the concourse **SHALL NOT** conflict with ticketing and signing functions, patron movement patterns, or sightlines that enhance security.
- Vertical Circulation Spaces (elevators and stairways): The placement of advertising in vertical circulation spaces could constitute a distraction for the patron. Advertising **SHALL NOT** be located at the top and bottom landings of escalators and stairs.

- Platform Level: Any advertising **SHALL NOT** conflict with system signing and information.

Maintenance and performance standards for advertising are as follows:

- All materials used in the fabrication of advertising panels **SHALL** be durable and vandal-resistant.
- Advertising panels **SHALL** exhibit low maintenance characteristics such as requiring minimal effort to clean.
- Advertising **SHALL** be in conformance with all applicable codes.
- In general, where advertising panels are provided, their framework **SHALL** be standardized for ease of maintenance and replacement of advertising media.

5.13 Concessions

Concessions may be provided through kiosks, temporary carts, or permanent structures where vendors provide food, drinks, and other retail items. Sound Transit Board Motion M98-66 provides direction for concession areas.

Key considerations for any concession facility are as follows:

- The operation of concessions **SHALL NOT** interfere with transit operations or pedestrian flows. Concession facilities **SHALL** be maintained by the concessionaire.
- Concessions should be located in the vicinity of the passenger boarding areas.
- The number of areas set aside for concessions should be a function of the peak number of patrons using the facility.

Transit center designers should consider including space for possible future concessions. Space needed for a concession area may include the following items:

- Accommodations for a cart or stand,
- A location for the vendor to sit,
- A buffer zone surrounding the entire cart and stand allowing the concession operator to circulate around the cart or stand, and
- A queuing zone for patrons waiting to be served.

If a concession is being provided, utilities connections **SHALL** be identified. For temporary carts, connections to water service should be provided. For permanent concession areas, the types of connections will be determined by the expected use. Potential services include water, sewer, or gas.

Chapter 6 – Operational Support

Chapter 6 presents standards and guidelines for the following transit center elements that support operations:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

6.1 Operators' Restroom

Operators' restrooms are located at transit centers throughout the region. All operators' restrooms are accessed using a universal key. Police officers and other staff also have keys to the operators' restrooms.

Where restrooms are provided for operators, stub-in utility services for public restrooms **SHALL** be included.

The number of operators' restrooms will depend upon the number of buses laying over and/or stopping at the facility at a time. Operators should not be delayed by having to wait to use the restroom. All operators' restrooms **SHALL** be unisex restrooms, and **SHALL** be equipped with one toilet and one sink. In general, facilities with more than four bus bays should have two unisex restrooms.

Operators' restrooms **SHALL** be designed according to the following standards:

- Materials, finishes and fixtures SHALL be those required for any public restrooms.
- Finishes, fixtures, and equipment SHALL be selected and specified assuming an aggressive maintenance regimen.
- Restrooms SHALL include hand air dryers, since they require less maintenance and are less subject to vandalism/theft.
- Restrooms SHALL include jumbo roll toilet paper dispensers in stainless steel, since they require less maintenance and are less subject to vandalism/theft.

- Hot water heaters SHALL be the "on-demand" type. Hot water heaters SHALL NOT include holding tanks. Instead, the heaters can be located under the counter (one for each sink or a larger unit placed in a mechanical room similar to a tank unit).

- Sink faucets SHALL be automated so that they turn on as users pass their hands under them.

- Floors SHALL consist of sealed smooth concrete (rather than tile).

- Walls SHALL consist of concrete masonry blocks, sealed and painted.

The structure containing the operators' restrooms should last the entire life of the facility. Individual fixtures should have a life span of twenty-five years. Vandalism potential will likely be less than that expected for public restrooms.

6.2 Security Office

In general, Sound Transit does not provide office space for security personnel at transit facilities. Exceptions may be considered for larger transit facilities, such as Sounder stations, ST Express facilities with park-and-ride garages, and transit centers with more than four bus bays. Following are a few reasons why Sound Transit would consider a security office at a larger transit facility:

- To give security staff occasional protection from weather during their shift.

- To house security equipment, such as CCTV viewers and intercoms.

- To enhance patrons' perception of safety at the facility.

If a security office is provided, it should be designed to accommodate the expected number of security personnel and equipment anticipated in the near and long-term. The facility will be small, with an area not exceeding 100 square feet.

Security personnel will patrol the facility on foot. However, the office should be designed so that security personnel can also monitor the transit facility and public spaces from the office. This includes provision of windows so that staff can observe the facility and be seen by patrons. Where provided, security offices **SHALL** provide unrestricted views of passenger loading areas and direct views of entrances to public restrooms. Windows **SHALL** be glazed with laminated glass.

Designers should reference the IES Lighting Handbook for specifics on lighting level. Finishes, fixtures, and equipment **SHALL** be selected and specified assuming an aggressive maintenance regimen.

6.3 Customer Service Office and Window

Customer service facilities are small offices, including adjoining window and queuing areas, for customer service agents to serve patrons. These facilities are required at only a few, larger transit facilities in the region, and as such, will be designed on a case-by-case basis.

6.4 Janitor's/Storage Room

At major transit facilities a room should be provided for janitor's supplies and equipment. These facilities include Sounder stations and ST Express facilities with park-and-ride garages.

The room should be adjacent to other support facilities served with utilities (water, waste drainage, electrical power). A minimum of eight feet by ten feet clear floor area should be provided. The room should include shelving for janitorial supplies, as well as a floor drain and mop sink.

For lighting, designers should use guidance provided in Chapter 12 of this manual.

6.5 Staff Parking

Staff parking stalls would be used by Sound Transit and transit partner staff who need convenient and accessible parking at station facilities. At ST Express stations, one standard size parking stall **SHALL** be provided for use by agency staff. The stall should be located near the passenger boarding area. At Sounder stations, two stalls should be provided, one for Sound Transit/transit partner staff and one for BNSF staff.

Surface parking should conform to the standards of the agency responsible for maintenance and operations of the facility or Sound Transit standards, absent other direction. Staff parking areas should accommodate a wide range of vehicle types and operations, including standard automobile, compact automobile, van, or pickup truck.

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Chapter 7 – Civil Engineering Elements

Civil engineering elements of a transit facility are critical, and some can be extremely costly and complicated to modify if not designed and constructed properly. For example, proper drainage helps to ensure that storm runoff will not damage either Sound Transit facilities or nearby property.

Chapter 7 provides standards and guidelines for the following civil engineering elements of a transit facility:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

7.1 Drainage

The intent of drainage-related design standards and guidelines is to provide sufficient standardization of storm water management systems to simplify maintenance and improve performance. Standardization will also reduce the per-unit cost of parts and equipment during the life-cycle of the installation.

7.1.1 Key Goals for Drainage Guidelines

The design of drainage systems using the guidelines contained in this section is intended to achieve the following goals:

- To protect the roadway/track way and facilities from storm-runoff damage,
- To ensure the operational safety of the facility and the convenience and comfort of patrons,
- To protect Sound Transit from liability for damage to others' property from resulting storm-runoff either passing through or caused by Sounder and ST Express construction, and

- To reduce environmental impacts of storm water by minimizing storm water runoff to the greatest extent possible through the use of pervious surfaces, infiltration facilities, and other low impact techniques, as approved by Sound Transit's project manager. (Pavements bearing bus traffic may or may not be appropriate applications of pervious paving.)

7.1.2 Requirement of Other Agencies

The design of Sound Transit drainage treatments for facilities such as parking lots within Sound Transit right-of-way **SHALL** be in accordance with the criteria listed in the WSDOT Hydraulics Manual or of the appropriate local jurisdiction.

Design of drainage facilities belonging to another agency, which are relocated or modified because of Sound Transit construction, and which do not cross or parallel rail system facilities or track beds, **SHALL** conform to the design criteria and standards of that agency. In general, required relocation of existing drainage facilities **SHALL** be "replacement-in-kind" or "equal construction." Outside of Sound Transit ROW, design of drainage facilities **SHALL** conform to the requirements of the local jurisdiction.

Any facility drainage requiring review and approval by jurisdictional agencies **SHALL** be submitted in accordance with the procedures established by the respective agency. The designer **SHALL** be responsible for identifying the agency or agencies having jurisdiction. All construction, relocation, and restoration of storm sewers, drainage facilities, and maintenance of existing facilities during construction **SHALL** conform to the design standards of those agencies.

7.1.3 Drainage at Sounder and ST Express Facilities

Sounder and ST Express drainage criteria apply only to design of drainage facilities under the jurisdiction of Sound Transit. Drainage of other facilities and connections to other drainage systems **SHALL** be designed in accordance with the criteria of the respective agency having jurisdiction. Invert elevations and location of drainage facilities at the ends of contract design segments **SHALL** be coordinated with adjacent segments.

All drainage **SHALL** be by gravity flow, unless demonstrated to be infeasible. Where sections are below discharge points or in a tunnel where gravity outfalls cannot be provided, pumping stations **SHALL** be installed. No sanitary sewer discharge **SHALL** be permitted to enter the storm water drainage system at Sounder and ST Express facilities.

7.1.4 Hydrology and Hydraulics

The following procedures **SHALL** be used in preparing hydrologic computations:

- Hydrologic and hydraulic design **SHALL** be in accordance with current Washington State Department of Ecology guidance, the current WSDOT Hydraulics Manual, the current AREMA Manual for Railway Engineering, and the applicable local jurisdiction procedures.

- The hydraulic capacity of open channels, swales, gutters, storm sewer pipe systems, and culverts **SHALL** be determined using the *Manning* equation. Pipe flow velocities **SHALL** range from 3 to 10 feet per second where possible.

- Storm Frequency: the following facilities **SHALL** be designed/protected by accommodating the storm frequency listed:

    - All culverts and drainage facilities crossing the Sounder and ST Express system: 100-year
    - Track roadbed (to top of sub ballast for Sounder stations): 25-year
    - Longitudinal storm drains in roadways: 25-year
    - Parking lot storm sewer systems: 25-year
    - All longitudinal drains or sub-drains at low points could flood roadways or track roadbed in a 25-year period.

The above frequencies **SHALL** be modified if the local jurisdictional agency has a more conservative standard. Wherever feasible, the top of rail elevation **SHALL** be a minimum of one foot above the 100-year flood elevation.

7.1.5 Selection of Drainage Structures

Sound Transit maintained drainage structures within the track way **SHALL** be in accordance with Sound Transit's Standard Drawings. Drainage structures located within parking lots **SHALL** be selected from WSDOT standard plans or the local jurisdiction's standard plans. When conditions occur for which the standard drainage structures are not suitable, the engineer will be required to modify these structures or to design special structures which satisfy the conditions. Storm water pipes and vaults **SHALL** be adjusted to provide for the regular pattern of street trees, lightposts, and other above-ground visual features.

7.1.6 Pipe Materials

All underground storm drains maintained by Sound Transit **SHALL** be HDPE, reinforced concrete pipe (minimum class V, Wall B, with gasketed joints), or ductile iron pipe. Underdrains (located beneath the filter media used to remove suspended solids from the water) may be PVC, HDPE, or non-reinforced concrete pipe. All pipe materials designed for other facilities **SHALL** conform to the requirements of the local jurisdiction.

7.1.7 Parking Lots and Roadways

Parking lots **SHALL** be designed so that storm water is removed by overland flow, to a catch basin, gutter, or curb and gutter to an inlet where the water will enter a closed drainage system, an open ditch, a rain garden, or other bio-infiltration facility. Overland flow should be on at least a 2.0 percent grade wherever possible. One exception is along pathways used by customers; in these cases the slope cannot exceed ¼ inch to one foot slope. The maximum permissible spread for gutter flow **SHALL** be 6 feet. Bus lanes at platforms SHALL be designed to slope away from the platform at ¼ inch to one foot minimum slope for at least five feet.

7.1.8 Storm water Management Facilities

Design **SHALL** be prepared in accordance with the standards and specifications of the local jurisdiction and the Washington State Department of Ecology.

The designer **SHALL** evaluate sustainable alternative approaches for storm water management, such as re-using storm water for irrigation, exterior cleaning/maintenance, etc. Storm water **SHALL** be managed on-site wherever possible. Infiltration systems should employ low technology where feasible (e.g., bio-filtration water garden).

7.1.9 Construction Within the Flood Plain

Design of facilities to be constructed within the 100-year flood plain **SHALL** conform to the standards of the agencies having jurisdiction, including the US Army Corps of Engineers, the Federal Emergency Management Agency, the Department of Ecology, and the local jurisdiction.

7.1.10 Erosion and Sedimentation Control

In consultation with the Sound Transit Project Manager, the designer will work with the agency's Environmental Management staff regarding erosion and sedimentation controls.

The following are standards for erosion and sedimentation control:

- All areas disturbed by construction **SHALL** have temporary erosion and sedimentation control (TESC) plans. The TESC plans **SHALL** be prepared in accordance with work instructions of Sound Transit's Environmental Management Services. The work instructions can be requested from Sound Transit's project manager. The TESC Plans **SHALL** be approved by Sound Transit prior to initiation of site construction activities.

- Permanent erosion control plans **SHALL** govern site maintenance after construction is finished.

- Erosion control methods **SHALL** include Best Management Practices established by Washington State Department of Ecology and local jurisdictions.

7.1.11 Enhanced Site Soils for Water Resource Protection

In consultation with the Sound Transit Project Manager, the designer will provide for healthy soils to support water quality and storm water absorption on site.

- Where compacted construction soils are native soils, such as glacial till, all areas of soil that are not covered by mature vegetation or permanent project facilities **SHALL** be decompacted and amended with compost to provide for healthy, friable soils that absorb runoff, retain moisture, reduce the need for pesticides, and efficiently break down contaminants.

- Compacted soils on site **SHALL** be ripped to a depth of 18 inches, tilled, amended with a four-inch layer of compost, and compacted to 80% to 85% of standard proctor.

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Chapter 8 – Landscape Architectural Elements

This chapter provides objectives and design standards and guidelines for landscaping of Sounder and ST Express facilities. These facilities include stations, park-and-ride lots, drop-off areas, communications/signal facilities, and right-of-way (ROW) line sections. Landscaping and grading perform many functions at Sound Transit facilities, including:

- Encompassing and containing embankments and earthworks that shape the site and its drainage,
- Preserving a view corridor and sight line,
- Creating boundaries,
- Enhancing or screening of stations and ROW alignment,
- Conserving wetlands, streams, and the pre-Columbian native and indigenous flora and fauna,
- Eliminating noxious, aggressive, or invasive plant species, and
- Facilitating pedestrian access by means of footpaths.

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

Chapter 8 – Landscape Architectural Elements includes the following sections:

8.1 Overall Responsibilities of Landscape Architect

Landscape final designers **SHALL** be responsible for preparing construction documents for the landscaping and irrigation, if any, of facilities. Designs **SHALL** be consistent with the guidance provided in this manual, the preliminary design drawings, and in standard detail drawings for Sounder and ST Express stations.

Landscape final design **SHALL** also be designed taking into consideration the principles of Crime Prevention through Environmental Design (CPTED). Section 3.7 of this manual provides further information regarding CPTED.

In addition, landscaping design around stations and parking lots **SHALL** be coordinated with the communications systems designers to maintain sight lines of surveillance cameras, especially with respect to anticipated vegetation growth (see Section 13.3 – Closed Circuit Television Cameras). Exceptions may be desirable in some specific cases; recommendations or discussions of deviations are encouraged where this might result in improved design.

Landscape designs in parking lots and around stations **SHALL** be designed to perform water quality and detention or slowing functions to the maximum extent possible and **SHALL** prioritize the use of appropriate native plants.

Any deviations from the standards provided in these documents **SHALL** be identified by the design consultant and approved in writing by Sound Transit.

8.2 Objectives of Landscape Architectural Elements

Landscape architectural elements at Sounder and ST Express facilities are identified in this section. The attainment of these objectives **SHALL NOT** reduce the sight distance of train operators, bus operators, and the public with respect to Sound Transit Sounder/ST Express or other vehicular traffic.

Following are required design standards relating to landscape architecture elements:

- Plant materials installed around any historic building(s) **SHALL** be used in a manner that enhances the historic setting and character of the building.

- All areas that will not be regularly maintained **SHALL** be planted with ecologically appropriate native shrubs and trees to prevent noxious and/aggressive weed invasions.

- At park-and-ride lots, designers **SHALL**:

    - Provide planting islands and/or rain gardens in parking lots to create visual relief and shade in large paved areas. The ratio of planting islands to paving may be up to 30 percent.
    - Enhance pedestrian safety and security by providing clear sight lines for both vehicles and pedestrians between parking areas and transit platforms.
    - Provide attractive approaches to stations.
    - Establish visual screening of parking areas from adjacent properties while allowing for surveillance of public areas and secure operation of the facility.
    - Integrate design elements with adjacent areas.
    - Design plantings to reinforce vehicular and pedestrian movement paths.
    - Consider local jurisdictional codes for landscaping in parking areas.
    - Avoid introducing any species listed on the Washington State Noxious Weed Control List.

Following are additional design guidelines that indicate a preferred, but not necessarily required, direction. Landscape designers should:

- Provide a landscape design responsive to and compatible with standards for Sounder and ST Express operations, station architecture, graphics, furniture, art, and lighting design.

- Provide a safe, secure, comfortable, and attractive environment throughout the transit system, particularly at and along approaches to station entrances.

- Control access to the system by reinforcing designated pedestrian and vehicular circulation system movement and creating barriers to unsafe pedestrian movements within the facilities and elsewhere along the ROW, as required.

- Provide a landscape design that is compatible with local climatic conditions, with a preference for native plant materials, and conserving of water resources, preferably requiring no irrigation other than establishment watering.

- Achieve a landscape design that is compatible with the regional aesthetic character and with the character of existing neighborhoods adjacent to Sound Transit passenger facilities.

- Design a landscape that will require low maintenance in the short- and long- term, and consider the long-term growth and health of the plantings when selecting plant materials.

- Establish a recognizable visual character of the landscape design for all Sounder/ST Express stations through the use of paving, wayfinding, site amenities, and planting styles, while also maintaining compatibility with adjacent areas by adjusting the precedents set by previous designs to fit each new station.

- Provide visual screening where necessary to buffer incompatible adjacent uses.

- Protect, frame, and enhance existing views and vistas.

- Protect significant existing plant material to the greatest extent possible and appropriate, so as to preserve a sense of scale and the site's history.

- Create a site grading plan that acknowledges and complements existing use patterns of the site and coordinates with proposed site elements.

- Incorporate significant existing site features that complement the overall site design concept.

- Design planting areas and select plant materials to prevent the accumulation of grass, leaves, or other plant materials on the track, guideway, or boarding zone. In consultation with the project manager, the designer will work with Sound

Transit's Capital Projects staff to obtain the most current update of the agency's track and signal design standards.

8.3 Codes and Standards

Local codes relating to landscape elements **SHALL** be considered to help ensure acceptance of designs during jurisdictional design reviews. The designer **SHALL** consult with local authorities having jurisdiction to conform to policies and plans that are in existence.

In addition, the following standards and guidelines should be referenced:

- American Standard for Nursery Stock ANSI Z60.1, as adopted by the American Association of Nurserymen, Inc.
- Bailey's Standard Encyclopedia of Horticulture.
- Standard Plant Names, American Joint Committee on Horticulture Nomenclature (AJCHN).

8.4 Site Preparation

Two major considerations in site and preparation are finish grading and slope stabilization. The following further describes these items.

8.4.1 Finish Grading

Finish grading should meet existing grades of adjacent areas where possible to avoid need for retaining structures. The following are design standards for finish grading:

- Minimum depth of topsoil **SHALL** be four inches in seeding or turf areas, 12 inches in areas to be planted with shrubs, and 18 inches in areas to be planted with trees. All planting areas **SHALL** be amended or covered with topsoil, except for planting pits, which **SHALL NOT** be amended in order to prevent inadequate root development. Topsoil **SHALL** be placed and compacted in a uniform manner to prevent uneven settlement. Topsoil nutrients **SHALL** be coordinated with the plant material to be installed.
- Rock, including shale, in cut areas that are to be seeded or sodded **SHALL** be covered with 12 inches of topsoil. Finished settled grade of topsoil in lawn areas **SHALL** be one to one and a half inches below adjacent hardscape. Topsoil **SHALL NOT** be stripped, placed or worked while frozen or wet. Topsoil **SHALL NOT** be placed on untilled or un-scarified surfaces.
- All surfaces, including planting areas, walks and paving **SHALL** be graded to provide positive drainage. Water **SHALL NOT** drain across walkways. Walks or paving should drain to adjacent planted areas.

- Swales for surface drainage in lawn or planted areas **SHALL** have a shallow dished cross-section with a uniform longitudinal fall of two percent (minimum) to six percent (maximum).

- Seeded or sodded areas **SHALL** have a minimum slope of two percent (two feet fall per 100 feet) and maximum slope of one to three (one foot vertical change of grade per three feet of horizontal distance).

8.4.2 Slope Stabilization

Skillful grading and the incorporation of mounds and depressed areas **SHALL** be used where appropriate to control pedestrian movements, obscure objectionable views, and reduce objectionable noise.

- All slopes **SHALL** be stabilized to prevent physical failure, erosion, and maintenance problems.

- Slopes that are to receive aggregate mulches or to be planted in mowed turf **SHALL NOT** exceed one foot (vertical) to three foot (horizontal), (1 foot vertical to 4 foot horizontal on Seattle Parks property).

- Slopes that are to receive non-mowed grass or ground covers **SHALL NOT** exceed one foot (vertical) to three foot (horizontal). Straw **SHALL** be used to stabilize seeded slope areas and all newly seeded grass areas. (Straw not to be used on Seattle Parks property).

- Open anchored matting **SHALL** be used to stabilize sodded or seeded slopes and swales (surface flow lines) exceeding six percent gradient.

- Stable rock cut faces **SHALL** be left exposed.

- Vertical transition curves, 6 feet to 20 feet in radius as appropriate to scale of slope, **SHALL** be provided at top and bottom of slopes or mounds.

The following plants or materials are suitable for slope stabilization and erosion control:

Material	Slope (Maximum): Vertical to Horizontal
Turf, mowed	1 to 3
Grass	1 to 2
Myrtle, pachysandra, etc.	1 to 2
Stone, rip-rap	1 to 1.5
Cut Stone	1 to 1
Brick Paving	1 to 1
Concrete block paving	1 to 1

If new grading is properly blended with the existing grades, any need for retaining walls should be minimal. Where they are used, retaining walls **SHALL** be treated as an

architectural element with consideration being given to scale, color, texture, contrast, and materials appropriate in relationship to both the transit facilities and adjacent neighborhoods.

8.5 Plant Materials

Following are standards and guidelines regarding plant materials:

- Plantings **SHALL** be used to enhance the environment of the station areas and to integrate them with their surrounding context, taking into consideration CPTED principles. Planting design **SHALL** emphasize utilization of hardy, drought tolerant, low maintenance plant material that can exist without supplemental water in the local climate after a 3-year establishment period. Preference **SHALL** be given to pre-Columbian native plant materials.

- In planting areas without irrigation systems, plant material **SHALL** be able to survive with natural rainfall. Planting areas which contain less hardy plants **SHALL** be used sparingly and **SHALL** be irrigated. All landscaping in the vicinity of historic buildings **SHALL** conform to the requirements of the Standards for Rehabilitation of the U.S. Department of the Interior, latest edition.

- Plant material **SHALL** all be rated "hardy" for use in US Department of Agriculture Climate Zone 8, with the exception of seasonal ornamental planting areas.

8.5.1 Landscaping Considerations

Any selection of plant material **SHALL** emphasize pre-Columbian native species and **SHALL** avoid invasive species. Other considerations, in order of importance, for the selection of plant material include the following:

1. Appearance and seasonal form and color
2. Hardiness
3. Disease and pest resistance
4. Tolerance to water/lack of water
5. Tolerance to wind, pollutants, and salt
6. Availability
7. Initial cost
8. Maintenance requirements
9. Seed/fruit/bloom toxicity
10. Mature height and spread
11. Growth rate
12. Sun/shade preferences

13. Deciduous/Evergreen
14. Leaf size (smaller leaf size is preferred)
15. Soil and drainage conditions requirements
16. Transplant tolerance

8.5.2 Irrigation Requirements

Following are standards and guidelines for irrigation:

- Provide an "establishment irrigation system" for all planting areas at stations and station areas. Irrigation system **SHALL** be designed to minimize water usage. Plantings with different water requirements **SHALL** be zoned separately to ensure adequate water supply to each plant type. The system **SHALL** be Weathermatic RM series with the number of stations identified on the landscape drawings.

- The controller **SHALL** allow timed watering schedules, have the ability to alter the watering schedule seasonally, and have the capability to manually interrupt the schedule in times of weather inconsistent with typical seasonal variations. The irrigation system **SHALL** be designed to address slope conditions and prevent run-off of irrigation water.

- Yard hydrants **SHALL** be provided at station sites and in park-and-ride lots for general maintenance and for emergency and back-up irrigation. The locations **SHALL** be coordinated to permit site coverage with a 100-foot hose, except as approved in writing by Sound Transit.

- Irrigation system **SHALL** provide for remote control access and system-wide compatibility. Temporary irrigation, designed for service during a 3-5 year establishment period, **SHALL** be used wherever possible.

- To reduce long-term maintenance, pipe for irrigation and ground hydrant supply lines **SHALL** be High Density Polyethylene (HDPE).

- Irrigation system **SHALL** be designed to minimize vandalism opportunities.

8.5.3 Trees, Shrubs, and Ground Covers

Following are standards and guidelines for trees, shrubs, and ground covers:

- Mature, healthy, existing trees of appropriate species **SHALL** be preserved where possible and **SHALL** be indicated in the contract documents, with appropriate protection against damage from construction activities specified.

- Trees proposed along public rights-of-way **SHALL** enhance the existing street tree pattern, if any, or **SHALL** be a part of a street tree pattern established by the local governmental authority for adjoining areas. Where no pattern exists, an orderly pattern **SHALL** be established.

- Minimum caliper of trees located in paved pedestrian areas **SHALL** be 2.5 inches. Minimum caliper of trees in unpaved areas **SHALL** be 2.0 inches. Trees **SHALL** be spaced an appropriate distance apart depending on the species and design intent. For visibility and security, trees **SHALL** have no branches or foliage below a height of seven feet as measured from the base of the trunk.

- Tree location **SHALL** be adjusted to accommodate existing subsurface conditions such as utilities and vaults, as well as special conditions such as existing or proposed sidewalk canopies, awnings, and shelters.

- Excavation for tree root balls **SHALL** be minimally 2 times wider and six inches deeper than the size of the ball. A tree grate with minimum area of 24 square feet **SHALL** be provided in paved areas to prevent compaction of the soil surface (5'x.5' or 4'x 6' typical). Coordination with the municipality having jurisdiction is required to determine local requirements. Tree grates **SHALL** be designed to support the weight of one wheel of a service vehicle and **SHALL** allow for sections to be removed to accommodate tree growth. Steel tree guards **SHALL** be considered only where necessary at locations where tree trunks are likely to receive abuse from service vehicles, snow removal equipment, or pedestrians.

- Trees in pedestrian areas **SHALL** be staked, using a standard staking detail or as approved by Sound Transit. For non-pedestrian areas, trees **SHALL** be staked or guyed. Trees **SHALL** be guyed only where necessary. Underground staking, which enables root balls to be staked underground in high pedestrian traffic areas, **SHALL NOT** be allowed without prior approval.

- Where shrubs are used, they **SHALL** be selected and grouped in a manner to minimize maintenance. Ground cover **SHALL** be used in landscaped areas and slopes where pedestrian activity is to be discouraged. Vines should be used selectively to landscape and soften vertical surfaces, while keeping requirements for pruning and other maintenance to a minimum. For visibility and security, shrubs and ground coverings **SHALL** have a height not greater than three feet.

8.5.4 Herbicides/Fertilizers

Following are standards and guidelines for the use of herbicides and fertilizers:

- To minimize use of herbicides and fertilizers, landscape features **SHALL** include mulching, ground cover, and other planting strategies that discourage growth of undesirable species. Plant material **SHALL** be fertilized as needed at the time of installation and a fertilization schedule included in the maintenance schedule, broken down by plant type and species. Preference **SHALL** be given to natural fertilizers such as compost tea.

- Pre-emergent weed treatments **SHALL** be applied with other amendments and fertilizers per ST standard specification or as approved by Sound Transit. Hand weeding is the preferred method of weed removal. Products used **SHALL** be organic, when available, or a product that is proven to be non-persistent and non-

damaging to the environment. Mulching **SHALL** be used as a method of weed suppression and soil amendment.

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Chapter 9 – Structural Elements

An important task of the transit facility designer is to ensure that the facility is structurally sound. The structural integrity of the facility is a function of a number of elements, such as characteristics of the site's soil and the building materials selected by the designer.

Chapter 9 presents an overview of relevant codes, guidelines, and standards as follows:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

9.1 Overall Responsibilities of Structural Engineer

The structural design for the transit facility **SHALL** meet all applicable State of Washington general laws and regulations and the current editions of the codes, manuals, or specifications identified in this section. Where the requirements stipulated in any such document or by these criteria are in conflict, the stricter **SHALL** govern.

Unless specifically noted otherwise in these standards, the latest edition of the code, regulation, or standard that is applicable at the time the design is initiated **SHALL** be used. If a new edition or amendment to a code, regulation, or standard is adopted before the design is completed, the design **SHALL** conform to the new requirement(s), as required by the authority having jurisdiction.

For buildings and stations, the design **SHALL** meet all Occupational Safety and Health Act (OSHA) standards, the Americans with Disabilities Act (ADA), the Washington State Accessibility Standards, the International Building Code (IBC), and local codes.

9.2 Building Codes

Building codes to be followed by the designer **SHALL** include both the International Building Code and other codes, manuals, and specifications. These are further described in this section.

9.2.1 International Building Code

In all areas, the design for the construction of Sound Transit passenger facilities **SHALL** be in accordance with the International Building Code (IBC) of the International Conference of Building Officials, as adopted and amended by the State of Washington.

9.2.2 Other Codes, Manuals, and Specifications

Other codes, manuals, and specifications will need to be applied by the designer as appropriate. For example, for Sounder stations, the designer **SHALL** comply with the Manual for Railway Engineering of the American Railway Engineering and Maintenance of Way Association (AREMA). The designer **SHALL** consult with officials of the local jurisdictions regarding applicable codes in the early phases of design and before the 30 percent submittal to Sound Transit.

9.3 Soils and Geologic Data

The following are guidelines to be used by the designer for soils and geological design.

- At the outset of the project, the designer **SHALL** review any geotechnical analysis that has been carried out for the project.

- Earth, rock, and water pressures on structures vary considerably with geographic location. These pressures and other geotechnical parameters affecting the design **SHALL** be determined by the designer through reference to any geotechnical report(s) and by consultation with any geotechnical consultant(s).

- Design bearing and frictional values for foundations **SHALL** be determined by the designer through reference to the geotechnical report(s) and by consultation with the geotechnical consultant(s).

- The designer **SHALL** identify and recommend for further investigation all known or suspected areas of the site and immediate surrounding areas where unusual soils or geologic conditions exist. This identification and subsequent recommendations should be based upon available existing soils and geologic data, on data obtained from any additional geotechnical investigation, and on the professional judgment of the designer,

- The design bearing and frictional values for foundations **SHALL NOT** exceed the limits given by the State of Washington Building Code, except for deviations as provided for in the code.

9.4 Reinforced and Pre-stressed Concrete

The following identify guidelines to be used by the designer in designing reinforced and pre-stressed concrete elements.

9.4.1 Parking Garages

- Concrete utilized for structured parking garages **SHALL** be dense, with a low water-to-cement ratio, and **SHALL** be a mix yielding concrete of low permeability.

- Concrete slabs **SHALL** receive waterproofing or sealing as per industry standards and specific project requirements, as appropriate for their exposure to weather.

- The underside of deck slabs **SHALL** remain bare concrete, unless painted to enhance light reflectance.

- Consider graffiti and scratch protection coatings for all exterior surfaces at ground level and within 12 feet of accessible reach, and for all interior surfaces except floors.

- Top floors of structures **SHALL** be designed to prevent the seepage of water through to lower levels of the structure.

- Staircases **SHALL** be designed so that water does not drip through onto stairs beneath.

9.4.2 Architectural Considerations

In order to ensure uniformity of structural concrete color in public areas of the facilities, it will be necessary to standardize concrete mix designs, strength specified, the aggregate source, and the brand of cement to be used in any given area. This standardization **SHALL** apply to all concrete exposed to public view within the facilities or to the concrete exposed to view from outside the facilities.

Cast-in-place concrete (CIP) could be considered for a facility. However, the designer **SHALL** provide Sound Transit with the specifications for any cast-in-place (CIP) architectural concrete, before initiating any design effort, for Sound Transit's review and direction.

9.5 Structural Steel

Consideration **SHALL** be limited to the following types of structural steel. Other types may be used only with the approval of Sound Transit.

9.5.1 Structural Steel

- For normal use – ASTM A36.

9.5.2 High-Strength Structural Steel

- For uses requiring higher-strength steels or where economically justifiable – ASTM A242, A441, A514, A572, A588.

9.5.3 Connections

- Shop connections as detailed by the designer **SHALL** be shop-welded whenever possible and unless otherwise approved. Welding **SHALL** be in accordance with the current code or specifications of the American Welding Society, Inc., D1.l Series, as applicable.

- Field connections **SHALL** be designed for high-strength bolts, or for welding if bolting is impractical. High-strength bolts **SHALL** be ASTM A325 unless otherwise approved by Sound Transit.

9.6 Foundations

Foundations for girder spans up to 150 feet in length **SHALL** have predicted total settlements less than 1 inch or differential settlements less than ¼ inch. For spans over 150 feet in length, the designer **SHALL** develop settlement values that meet the approval of Sound Transit. Any proposed deviation **SHALL** be submitted to Sound Transit for prior approval.

9.6.1 Spread Footings

- The design **SHALL** keep the maximum soil pressure for the various loading combinations within the allowable bearing value and soil pressures as nearly uniform as practicable. Spread footings **SHALL** be considered to be shallow foundations.

9.6.2 Pile Substructures

- Pile substructures **SHALL** be designed so that the load on any pile does not exceed its allowable load, which **SHALL** conform with allowable percentage of basic unit stress for various loading combinations given in AASHTO Bridge Design Specifications (can be purchased here). Design should allow for an accidental misplacement of the center of gravity of the substructure, 6 inches in any direction. Pile substructures **SHALL** be considered to be deep foundations.

- For Group I loading, the uplift force on any friction pile **SHALL NOT** exceed 5 percent of its design capacity. For other group loadings, the uplift on any pile **SHALL NOT** exceed 25 percent of its design capacity. Any proposed deviations **SHALL** be submitted to Sound Transit for prior approval.

- Uplift **SHALL NOT** be permitted for bearing piles or combination bearing and friction piles.

9.6.3 Selection of Foundation Types

A deep foundation **SHALL** be used when a shallow foundation cannot be designed to carry the applied loads safely and economically. Deep foundations **SHALL** also be used where scour, erosion, or settlement might occur, and the soil conditions permit their use. This will be required even though the bearing capacity of the soil is sufficient to make practical the use of shallow foundations.

It is the Designer's responsibility to select a foundation type or types. Such selection **SHALL** be based upon several factors, including but not limited to:

- Conditions prevailing at the site,
- Cost of design and construction,
- Availability of materials and installation craftsmen, and
- The desire to stimulate competition among the suppliers of alternate materials.

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Chapter 10 – Architectural Elements

Sound Transit works with local public transportation agencies, communities, and local governments to site and design transit facilities that complement and improve local community plans. The architectural design of the transit facility **SHALL** be functional while fitting sympathetically in the community in which it is located.

Chapter 10 presents standards and guidelines for architectural elements of a transit facility, organized as follows:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

10.1 Overall Responsibilities of Architect

The design of the transit facilities **SHALL** result in a permanent civic architecture that contributes to their context. Each facility's design **SHALL BE** a recognizable element of the transit system, and **SHALL** be clearly an integral part of the neighborhoods and community. Within this framework, the designer **SHALL** pursue standardization in design as follows: develop a family of elements and parts for transit facilities that are interchangeable and recognizable but that also allow for the individual character of each neighborhood or community to find expression.

The scope of architectural enhancements **SHALL** be governed by ST's Scope Control Policy (Sound Transit Board Motion M2002-121), adopted by Sound Transit in 2002 to help guide Sound Transit staff in responding to local partners' requests for enhancement to projects. It is the policy of the Sound Transit Board to develop cost-effective transportation projects that maximize transit benefits, minimize costs, and encourage prudent management of resources in developing a project. This policy includes the following general principles for staff to use to control the scope of projects:

- Initial Scope Definition
- Project Development
- Mitigation
- Baseline Scope
- Requests for Enlarged Scope

Recognizing the mutual benefits of Sound Transit's transportation investments, local public transportation agencies, communities, and local governments (Sound Transit's partners) may identify improvements that exceed standard facility designs. In such instances, partners will work with Sound Transit and contribute toward the costs of improvements, in accordance with Sound Transit's adopted Scope Control Policy.

10.2 Common Design Features

Novelty of architectural design at each site results in different maintenance task lists at each site as well as resulting higher initial costs, potential customer confusion, and reduction of agency identity. The designer should instead concentrate on common design features. Use of common design features in Sound Transit facilities will:

- Contribute to an agency brand identity that is embodied in the facilities
- Simplify customer wayfinding
- Help reduce costs for replacement parts through bulk purchases and simplified maintenance procedures.

10.2.1 Sustainable Design

When designing a transit facility, designers **SHALL** consider factors that reduce environmental impacts and costs of constructing, operating, and maintaining facilities, such as those listed below:

- Design buildings and systems to maximize energy performance.
- Include bike racks and/or lockers in station design.
- Design facility to enhance public safety.
- Design facilities to include the use of non-polluting and renewable energy, such as solar photovoltaic, wind, geothermal, low-impact hydro, biomass, and bio-gas strategies. Strategies should also take advantage of net metering with the local utility.
- Incorporate sunlight into the design to reduce heating needs in the winter and lighting needs throughout the year.
- In design specifications, avoid the use of finite raw extracted materials and long-cycle renewable materials. Instead designers should use more rapidly renewable materials such as bamboo flooring, wool carpets, straw board, cotton batt insulation, linoleum flooring, poplar oriented strand board (OSB), sunflower seed board, wheatgrass cabinetry, and others, as appropriate for a given use of a facility.
- Incorporate natural ventilation into the design where possible to conserve energy.

- Use materials with "low embodied energy," such as local timber and stone.
- Design building to include an area for collecting and storing recyclables.
- Consider, where feasible, the reuse of existing buildings or elements of existing buildings, with updates of outdated components.
- Consider incorporating salvaged materials into building design (e.g., beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick and decorative items), when cost-effective.
- Where appropriate, design facilities to include "green roofs" for drainage and temperature control. To reduce roof heat absorption, designer may consider installing high-albedo (i.e. very reflective) and vegetated roofs.
- Incorporate low emissivity (low-E) glass into the design to allow light to enter while also providing thermal insulation.
- Maximize water efficiency in the design to reduce the burden on municipal water supply and wastewater systems. For example, wastewater could be reduced by specifying high-efficiency fixtures and dry fixtures such as composting toilets and waterless urinals; design could include reuse of storm water or the use of greywater for sewage conveyance or on-site wastewater treatment systems.

Guidelines for selecting sustainable materials are included in Section 10.3.3.

10.3 Criteria for Selection of Materials

The following basic requirements and criteria have been established for finish materials used in public and ancillary areas within transit facilities. While convenience, comfort and attractiveness **SHALL** be considered in the selection and application of finishes, essential attributes that **SHALL** also be satisfied include: safety, durability, and economy.

10.3.1 Appearance of Materials

Following are the standards and guidelines for the appearance of finish materials. Finish materials **SHALL**:

- Be visually and tactilely pleasing.
- Avoid creating floor patterns that are disorienting to patrons moving across them due to high contrast or distracting patterning.
- Facilitate passenger guidance, information, safety, and security in a pleasing manner that contributes to overall design excellence.

- Be selected so the color is consistent with system-wide identity colors, compatible with the facility's surroundings, and of sufficient contrast and accent to attract the eye, convey feelings of warmth, and conceal minor soiling.

10.3.2 Safety

Materials **SHALL** be selected so as to reduce risk of hazard to patrons and maintenance staff. With respect to safety:

- Fire resistance of facilities **SHALL** be maximized, and smoke generation hazard from fire **SHALL** be reduced, by using finish materials with minimum burning rate, smoke generation, and toxicity characteristics consistent with Code requirements as noted in IBC and NFPA 101, Life Safety Code.

- Proper fasteners and adequate bond strength **SHALL** be used to minimize hazards from dislodgment due to temperature change, vibration, wind, seismic forces, aging, or other causes, such as vandalism.

- Floor materials with non-slip qualities **SHALL** be utilized to increase pedestrian safety and accommodate the needs of individuals with disabilities. Stairways, walkways, platform edge strips, and areas around equipment **SHALL** have high-friction, non-slip properties. Areas of less use or hazard may have lower coefficients of friction. All specified floor materials **SHALL** be resistant to damage from common de-icers.

- Materials **SHALL** accommodate the specific needs of the mobility disadvantaged and the requirements of the Americans with Disabilities Act (ADA).

10.3.3 Sustainability

When selecting materials and developing designs, designers **SHALL** consider the following sustainability factors:

- Life-cycle energy demands of each material to extract, process, fabricate, transport, market, decommission, and eventually return it again to a state that is readily usable.

- Maximization of use of recycled content in materials, where doing so is consistent with requirements for quality and durability.

- Selection of materials for a long useful life.

- Selection of materials that can be cleaned with non-toxic and environmentally friendly cleaning products and processes.

- Selection of exterior materials that reduce heat island effects (i.e., light colored concrete in lieu of asphalted paving where appropriate and feasible).

- Use of low-emitting paints, sealants, adhesives, carpets, and composite wood products in design specifications.

- Integration of recycled materials into public art.

- Use of materials with "low embodied energy," such as local timber and stone.

Guidelines for incorporating sustainability into the facility design are included in Section 10.2.1.

10.3.4 Durability/Adaptability

Durability, graceful aging, and adaptability are of paramount importance in selection of materials. Following are standards and guidelines for selecting materials for durability and adaptability:

- Materials with excellent wear, strength, and weathering qualities **SHALL** be used, with due regard to both initial replacement costs and required maintenance.

- Materials **SHALL** be colorfast and maintain their good appearance throughout their useful life.

- For ceiling and canopy finishes/systems and their application, materials **SHALL** allow for commissioning, adjustment, and future retrofitting of subsystems such as CCTV and public address systems.

- Materials should also be:

    - Easily maintainable and repairable.
    - Fire resistant, and produce minimal debris or fumes and smoke in a fire (avoid combustibles).
    - Of high quality and installed at high levels of workmanship.
    - Selected with consideration to the total acoustic environment, so as to minimize reverberation while meeting other design and performance criteria.
    - Selected with respect to costs by balancing initial material costs against long-term maintenance costs.
    - Easily replaced/repaired, such as by including a wear surface separate from the structural slab to facilitate replacement when a floor is in a heavy wear area.
    - Chosen, where appropriate, with reference to the potential need for access to service ducts, etc. When the zone from floor level to eight feet on vertical surfaces, called the contact zone, is subject to abuse and willful damage, finish materials in this area should be especially resistant and capable of repair in a cost-effective manner.

- Some surfaces may require the design and specification of clips to deter damage from skateboards. Clips should be as unobtrusive as possible, consistent with their purpose.

10.3.5 Ease of Maintenance

Finishes **SHALL** be selected for ease of cleaning, repair, or replacement. The following provides further direction regarding maintenance of materials.

10.3.5.1 Cleaning

- Materials should be selected to facilitate cleaning and reduce cleaning costs by specifying those that do not soil or stain easily, that have surfaces that are easy to clean in a single operation using standard equipment and benign cleaning agents, and on which minor soiling is not apparent.

- Materials **SHALL** be cleanable with commonly used equipment and environmentally benign cleaning agents.

- Platform walking surfaces **SHALL** utilize materials that are not damaged by pressure washing.

- Station elements **SHALL** be detailed to discourage birds from roosting on them.

- Access to windows for cleaning **SHALL NOT** be obstructed except where absolutely necessary (required structural member, etc.). Windows above ground level should be placed such that they can be accessed from below using a lift, and accessing windows for cleaning should not require getting into traffic or onto a railroad track. If cleaning or replacing windows or maintaining a structure requires access by rappelling down the side of the structure, then safety tie-off anchors **SHALL** be provided per code.

10.3.5.2 Repair or Replacement

- To reduce inventory and maintenance costs, materials **SHALL** be specified that are readily available and can be easily repaired or replaced without undue cost or interference with facility operations. For example, hose bibs, electrical outlets, lighting fixtures and lamps, glass or plastic lights, etc. **SHALL** be standardized on commonly available sizes and finishes to ease inventory stocking or direct purchase.

- Spare quantities **SHALL** be provided for tile and other applied-unit materials in an amount equal to approximately two percent of the total material used.

10.3.6 Resistance to Vandalism

Finishes selected should be resistant to vandalism through the following:

- Materials selected and details provided should not encourage vandalism and should be difficult to deface, damage, or remove.

- All surfaces exposed to the public **SHALL** be finished in such a manner that the results of casual vandalism can be readily removed with common maintenance techniques and cleaners.

10.3.7 Non-Proprietary Materials

- Non-proprietary materials **SHALL** be specified for designs of system facilities in order to obtain competitive bids and comply with Federal regulations. Materials specified should be available from multiple local vendors, not only through special order or from regionally franchised vendors.

- Proprietary materials **SHALL** be considered by Sound Transit only where it is established that no other materials exist that would meet the particular design requirements. Such items **SHALL** be specified on a performance specification basis only with written permission of Sound Transit's project manager; Sound Transit may direct specification of proprietary items if it determines this to be in its best interest.

10.3.8 Unit Size

- Units **SHALL** be large enough to reduce the number of joints yet small enough to facilitate replacement if damaged. Monolithic materials may be used if they can be easily repaired without the repair inhibiting function or being noticeable.

10.3.9 Installation Standards

- Materials **SHALL** be detailed and specified to be installed in accordance with industry standards and manufacturers printed directions for long life, low maintenance, and compliance with warranty requirements.

10.4 List of Finish Materials

The list of materials that follows is general and summary in nature and applies to all areas of public use and contact. Exceptions to the list **SHALL** be reviewed and approved by Sound Transit prior to use in design. The use of items listed as "acceptable" is subject to location and environmental considerations.

10.4.1 Exterior Materials

Exterior materials generally refer to materials used to finish surfaces of a transit facility that are directly exposed to the climatic environment including sun, wind, and rain. Materials should be selected that are highly resistant to vandalism, and retain their original appearance with a minimum amount of maintenance and repair.

For any steel structures, the selected paint should be consistent with WSDOT Standard Specifications for Road, Bridge, and Municipal Construction; specifically Division 6-07 Painting, Section 6-07.3(1) - Painting New Steel Structures. The standard calls for use of a three-part moisture-cured urethane coating system that includes a zinc-rich primer.

10.4.2 Exterior Paving Materials

General site paving refers to the finish of areas exterior to the station proper and used as walking surfaces. A preliminary list of generic materials meeting these criteria is:

Acceptable
Granite (trim)
Quarry tile (trim)
Brick pavers (trim)
Concrete pavers
Poured-in-Place concrete – textured/sandblasted and sealed

Not Recommended
Bituminous toppings
Synthetic resin toppings
Terrazzo
Marble

10.4.3 Open Wall Elements:

Open wall elements refer to the finish of vertical wall surfaces that provide enclosure while permitting ventilation and/or views into and out of station areas.

Acceptable
Expanded metal, 16 gauge or heavier
Perforated metal, 12 gauge or heavier
Stainless steel railing system, including cable stays
Metal louver

Not recommended:
Welded-wire mesh chain-link fabric
Laser-cut sheeting or other special work that is difficult or expensive to replace

10.4.4 Canopy Materials

Acceptable
Baked/coated steel roofing
Aluminum roofing
Structural steel
Laminated tempered glass
Translucent panels such as Kalwall

Not Recommended
Tile roofing
Built-up roofing

10.4.5 Metallic Surfaces and Fixtures:

Wall panels, railings, posts, columns, fences, trash containers, bench supports, miscellaneous metal

Acceptable
Painted galvanized steel
Stainless steel (areas of high pedestrian use) when designing a transit facility:
Painted galvanized steel
Porcelain enamel on steel
Factory applied hard-baked enamel on steel or tempered aluminum plate
Factory applied powder coating on steel
Polyurethane (3 coat system)

Not Acceptable
Site-painted metals

10.4.6 Required Materials and Families of Materials

The list of required materials that follows applies to all areas of the facilities. Public use and contact areas **SHALL** use the most durable materials. Exceptions to the list **SHALL** be reviewed and approved in writing by Sound Transit prior to use in the design.

10.4.6.1 Standardized Structural Grid

Designer **SHALL** use a basic grid of 4 feet to accommodate standardized glazing. Spacing of 16 feet – 0 inches will accommodate the standard platform edge light at stations. Use of a 2-foot grid will accommodate standardized glazing for windscreens and vertical elements of shelters.

10.4.6.2 Family of Pavers

Station designers **SHALL** use 24 inches x 24 inches nominal concrete pavers. Designers **SHALL** use Wausau Tile "Terra-Pavers" Type 3 Cotillio FDX or Abbotsford Concrete Products Ltd. "HydraPressed Paving Slabs" for all pavers except at platform edge.

Designers **SHALL** use a maximum of 3 colors to be used selected from the following approved colors:

- FDX 2008 Wausau Light Gray
- FDX 3008 Wausau Dark Gray
- FDX 4008 Wausau Dark Red
- FDX 5008 Wausau Dark Tan

Designers **SHALL** use 24-inch wide system-wide Platform Edge Detectable Warning Pavers at all stations and bus zones. Domes **SHALL** be spaced in an orthogonal pattern. Standard color to be muted yellow (Wausau USY 7008) to match all stations. (Link to Exhibit A-9)

10.4.6.3 Standardized Glazing Type and Sizes

Glazing for windscreens and passenger shelter canopies **SHALL** be specified and sized in accordance with Sound Transit's Standard Bus Passenger Shelter. The designer will work with Sound Transit's project manager to obtain the most current update of specifications for this shelter.

Elevator glazing **SHALL** meet dimensional standards whenever possible. Atypical glazing sizes may be used at elevator shafts to meet the dimensional criteria of the elevator.

10.4.7 Finishes

- Finishing of steel **SHALL** be completed with satin finish and high performance coatings wherever possible. Finishing of steel in the field **SHALL** be kept to a minimum by designing structures that can be shop fabricated in sections, primed and finished in the shop, and bolted together on site. Designers **SHALL** minimize field welding and touch up galvanizing and painting wherever possible.

10.4.8 Furnishings

The following describe materials-related standards for furnishings.

10.4.8.1 Benches

The designer **SHALL** choose from the following approved benches:

- "RS Public Seating" by Forms and Surfaces. This system consists of an aluminum modular bench system with intermediate arm rests, with and without backs, and designers should select the manufacturer's standard "stone" color.

- "Petosky" by Landscape Forms. This system consists of a removable perforated metal bench with powdercoat finish. Designers should select the manufacturer's standard "stone" color.

- 35-Series "Stay" by Landscape Forms. This system consists of a modular steel bench system with intermediate arm rests and powdercoat finish in the manufacturer's standard "stone" color. Backless seats are preferred.

10.4.8.2 Waste Receptacles and Ash Urns

- Designers SHALL select "Parc Vue" trash receptacle with 30 gallon capacity by Landscape Forms or similar approved receptacle. This is a ground mounted receptacle with a hinged, side opening, black polyethylene lid. It includes a cast iron base with wire mesh basket in powdercoat finish of the manufacturer's standard "stone" color. For security surveillance, clear plastic bags are preferred over polyethylene urn-shaped liner.

- Ash urns **SHALL NOT** be provided at Sound Transit facilities.

10.4.8.3 Modular Newspaper/Publication Vending Racks

Racks for newspapers or other publications **SHALL NOT** be allowed at Sound Transit facilities.

10.4.8.4 Bike Racks and Lockers

- Designers **SHALL** select Cora Bike Rack Model Expo "W" Series or a similar approved rack. It should be the standard size to accommodate 10 bikes.

- Designers SHALL select Cycle-safe Bike Lockers Model M/#DFR ProPark or a similar approved locker that stores 2 bikes per locker unit.

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Chapter 11 – Mechanical Elements

Chapter 11 presents standards and guidelines for mechanical elements of a transit facility, organized as follows:

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

11.1 Environmental Control Systems

This section describes the functional and design requirements for the environmental control systems (ECS). These systems will provide heating, ventilating, and air conditioning (HVAC) for Sounder and ST Express facilities. These standards and guidelines are intended to promote uniformity in design and to standardize the type and location of ECS equipment.

HVAC systems **SHALL** be provided for any ancillary rooms and concession areas at Sounder stations and ST Express facilities. ECS **SHALL NOT** be provided for patron areas unless the ECS is part of a joint development project or is specifically requested by Sound Transit.

Designers should consider the following sustainability-related design strategies:

- Minimize heat loss through the use of insulated doors with effective seals.
- Choose HVAC equipment that excludes CFC-based refrigerants.
- Design buildings and systems to maximize energy performance.
- Design buildings/facilities with equipment to measure energy performance.
- Draft a measurement and verification plan to use during building operation that compares predicted savings to those actually achieved.
- Include minimum indoor air quality performance standards (for construction and operation) in design specifications to prevent the development of indoor air quality problems in buildings.
- Include the use of non-polluting and renewable energy, such as solar photovoltaic, wind, geothermal, low-impact hydro, biomass, and bio-gas strategies, and take advantage of net metering with the local utility.

- Incorporate sunlight into the design to reduce heating needs in the winter and lighting needs throughout the year.

- Incorporate natural ventilation into the design to conserve energy.

- Incorporate "green roofs" for drainage and temperature control; to reduce roof heat absorption, consider installing high-albedo (i.e. very reflective) or vegetated roofs.

- Incorporate low emissivity (low-E) glass into the design to allow light to enter while also providing thermal insulation.

11.2 General Mechanical Considerations

The mechanical systems of most Regional Express and Sounder facilities will be relatively simple. Designers SHALL observe the following in their mechanical designs:

- Avoid the placement of hose bibs, electrical outlets, and other appurtenances in walkways. They are a trip hazard when their enclosures are left open.

- Provide hose bibs such that all walkway and platform surfaces are within a 180-foot radius of a water source.

- Heat tape for freeze protection is to be controlled by a contactor and thermal sensor. The thermal sensor SHALL be placed where it will be coldest in the building.

- Design piping so that the water can be shut off at a point before the piping leaves a temperature-controlled area. Install automatic drain valves that are positioned to drain the system without blowing out the lines.

Chapter 12 – Lighting Elements

The lighting standards contained in this chapter are to provide the functional and aesthetic guidelines necessary to design lighting for site areas, passenger stations, and transit-related parking facilities. Conformance with these standards is necessary to ensure uniform and adequate lighting levels for the system facilities, efficient maintenance of lighting and electrical systems, and to provide a high quality, convenient, safe, and efficient transit system for Sound Transit's riders.

Lighting of public streets and highways adjacent to Sound Transit facilities **SHALL** conform to the criteria and standards of the appropriate agency or jurisdiction.

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

General objectives for transit facility lighting are as follows:

- Promote safety by identifying and properly illuminating areas and elements of potential hazard. Of special concern are potential tripping hazards such as at entry to vertical circulation elements and at platform edges where crowding and rapid transfer to and from trains or vehicles can be anticipated.

- Enhance the system's visual and functional clarity by differentiating between site circulation networks such as drop-off zones and parking areas, station entrances, stairways or elevators, fare vending areas, platforms, tunnels, maintenance shops, and storage yards. Adequate lighting is particularly important to partially sighted individuals, who frequently depend on public transit for transportation.

- Maximize legibility of signs and self-illuminating message displays, which will require quite different approaches to lighting them and the surrounding area.

In Chapter 12, codes and standards for electrical elements are divided into the following sections:

12.1 Lighting Requirements for All Facilities

The following lighting-related standards and guidelines apply to all Sound Transit passenger facilities:

- The lighting system **SHALL** provide the intended quality and quantity of light for individual areas and be free from glare. Designers should avoid using luminaires that emit light above the horizontal plane, except when "up-down" luminaires are used to light both floor and ceiling planes. Designers should minimize light falling directly onto nearby facility windows and avoid any illumination onto adjacent properties.

- The lighting system **SHALL** be energy-efficient, using high-efficiency ballasts, lamps, and auxiliary equipment. Luminaires **SHALL** have integral ballasts and fuses unless special considerations dictate otherwise. Such considerations **SHALL** be brought to the attention of the Sound Transit project manager.

- Lighting equipment **SHALL** be vandal-resistant in spaces accessible to patrons or the public.

- The lighting system **SHALL** be designed to minimize life-cycle costs, taking into consideration capital costs.

- Luminaire locations **SHALL** permit ready accessibility for re-lamping and periodic cleaning. "Basis for Design" documentation **SHALL** describe how re-lamping will be accomplished and any special equipment needed for access to luminaires.

- Luminaires **SHALL NOT** be placed over stairwells or above fixed objects without provision for maintenance access being designed and incorporated in the project. When practical, luminaires should be placed no more than 12 feet above the ground. Pole-mounted luminaries **SHALL** be placed where they can be accessed by a lift truck for maintenance, and at least 25 feet from railroad tracks.

- Lighting **SHALL** be designed to satisfy security requirements and to produce a pleasant environment.

- Lighting system **SHALL** be designed so that the failure of any single lamp, or an entire luminaire, does not leave an area in total darkness or an unsafe level of illumination.

- Luminaires **SHALL** have tight-fitting clamping bezels to help control dust infiltration.

- Designers should consider the following sustainability-related design strategies:

- If feasible, include the use of non-polluting and renewable energy, such as solar photovoltaic, wind, geothermal, low-impact hydro, biomass, and bio-gas strategies, and take advantage of net metering with the local utility.
- Incorporate day lighting in lighting design.
- Include automatic timers/ambient light sensitive controls in facilities.
- Maintain safe light levels while avoiding off-site spill of lighting and night sky pollution

12.2 Codes and Standards

The following lighting-related codes and standards **SHALL** be consulted and referenced by the designers, as applicable:

- Illuminating Engineering Society Lighting Handbook (purchase at www.iesna.org)
- Americans with Disabilities Act
- Underwriters' Laboratories, Inc.
- Standard for Fixed Guideway Transit Systems (NFPA 130) (purchase at www.nfpa.org)
- Life Safety Code (NFPA 101) (purchase at www.nfpa.org)
- National Electrical Code (NFPA 70) (purchase at www.nfpa.org)
- Washington State Energy Code

12.3 Standard Equipment

Consistent appearance of facilities and their lighting levels can best be achieved with a high degree of standardization of the Sound Transit lighting system components. To that end, all luminaires and lamp types **SHALL** be standardized system-wide to unify the design of facilities and patrons' perceptions of them, and to simplify maintenance requirements. A system-wide approach to lighting design will allow the cost-effective procurement of lamps, luminaries, and auxiliary equipment, as well as simplify installation, repair, maintenance, and eventual replacement.

12.4 Lamps

The following lamp types have been identified as standard for all facilities. Use of other lamp types **SHALL** be permitted only with written permission of Sound Transit.

Watts	Lamp Description	Length	Initial Lumens	Rated Life hours)	Color Temp	CRI
18	F18DTT	6”	1,200	10,000	5000	82
32	F32TRT	5 ¾”	2,200	12,000	5000	82
32	F32T8/835	48”	2,950	24,000	5000	86
35	MH35PAR30/FL	4 7/8”	2,400	10,000	3000	81
38	F40TT	22 ½ “	3,150	20,000	5000	82
54	F54T5/835/HO	46”	5,000	20,000	5000	85
70	MH70/ED17	5 7/16”	6,200	15,000	3000	80
70	MH70/T6	4 ½”	6,200	15,000	3000	83
100	MH100/PAR38 FL	5 7/16th”	6,500	12,500	3000	83
100	HPS100/ED17	5 7/16th”	9,500	24,000	2000	21
175	MH175/ED17	5 7/16th”	17,500	15,000	4000	75
250	MH250/ED28	8 1/4th”	23,000	15,000	4000	65
400	MH400/ED37	11 ½”	44,000	20,000	4000	65

Lamps used for illumination of passenger stations and ancillary areas, including parking lots and pedestrian walkways in the vicinity of transit stations, **SHALL** be fluorescent or high-intensity discharge type and have a minimum color rendering index of 65.

For areas planned for CCTV coverage, lamps **SHALL** be mounted above the planned view of the CCTV cameras. Lamps **SHALL** have a minimum Color Rendering Index of 70, with a Light to Dark Ratio of 4:1 at design and 6:1 over time.

Metal halide lamps and auxiliaries **SHALL** be pulsed-start. In areas not generally accessible to transit patrons, lamps with a lower color rendering index such as high pressure sodium may be employed, but visibility needs and CCTV resolution should be carefully evaluated.

In all applications, energy efficiency **SHALL** be considered, and lower color rendering indices may be preferred if significant life-cycle savings can be demonstrated.

Innovative lighting systems incorporating new technology light sources such as sulfur lamps should be evaluated on a life cycle cost basis to determine advisability of application for Sound Transit facilities.

12.5 Illumination Levels

Luminance levels **SHALL** define and differentiate task areas, decision and transition points, and areas of potential hazard from background spaces. In addition to quantity of light, it is essential that illumination be designed to provide uniform distribution consistent with the design intention. Luminaires **SHALL** be selected, located, and/or aimed to accomplish their primary purpose while producing a minimum of objectionable glare and/or interference with task accuracy and vehicular traffic. There **SHALL** be no light spill onto adjacent properties.

Lumination levels **SHALL** be designed for light levels at two years bulb life. Illuminance and luminance levels **SHALL** meet the recommendations of the Illuminating Engineering Society of North America except as specifically noted below: Unless otherwise indicated, use a maximum uniformity ratio of 3:1.

Interior Locations	Illuminance/Average Horizontal Foot-candles
Station Platforms	20
Customer Emergency Stations	15[2]
Concessions	20
Staff Rooms	20
Stairs, Elevators, Escalators	15
Mechanical Rooms, Toilets	15
Storage/Custodial Rooms	15

Exterior Locations	Illuminance/Average Horizontal Foot-candles
Station Platforms – Covered	5
Station Platforms – Uncovered	5
Customer Emergency Stations	10[2]
Fare Vending Area	10
Parking Lots, Parking Garages, and Access ways	IESNA RP-20-98[1] Enhanced Security
Pedestrian circulation paths in parking areas	IESNA RP-20-98[1]; with higher level of illumination.
Load, Unload, Passenger Drop-off, Bicycle Stands	5
Pedestrian Walkways (adjacent to roadways)	5
Outdoor Plazas	5
Bus-Boarding Zones	5
Elevators & Stairways (outdoor entrances)	10
Bus Roadways	5

[1] Where security is a special concern or local law enforcement agencies feel that greater lighting levels are required, lighting design **SHALL** comply with IESNA G-1-03.
[2] Customer Emergency Station illuminance levels **SHALL** be measured within the area of the CCTV camera view.

12.6 Site and Plaza Lighting at Sounder Stations and ST Express Facilities

Site lighting at stations and facilities includes illumination for internal site circulation and access to the station. The placement of luminaires **SHALL NOT** obstruct the movement of vehicles. Luminaire placement **SHALL** be coordinated with the landscape and site plans to provide protection for light standards that are located adjacent to roadways, and to ensure that plantings will not obscure the lighting distribution pattern.

Lighting of outdoor plazas, station sites, pedestrian walkways, and similar areas **SHALL** be accomplished by utilizing luminaires on low poles. Illuminated bollards and other low-mounted luminaires **SHALL NOT** be used. Security lighting (minimum lighting level after station shutdown) **SHALL** be provided using the same pole-mounted luminaires fed from a separate security lighting circuit with photo control or control by astronomical clock only.

In Ticket Vending Machine (TVM) areas, lighting design **SHALL** ensure that lighting does not obscure visibility of touch-screen displays by glare or reflectance from screen surfaces.

12.7 Vehicular Access Lighting

- Vehicular access lighting **SHALL** guide motorists naturally and intuitively to the bus areas and passenger drop-off zones. The luminance on all access and egress roads **SHALL** be graduated up or down to the luminance level of the adjacent street or highway.

12.8 Pedestrian Access Lighting

- Pedestrian access lighting **SHALL** define pedestrian walkways, crosswalks, ramps, stairs, and bridges, highlighting decision and transition points and areas of potential hazard.

12.9 Sounder Station and ST Express Platform and Public Area Lighting

Following are standards and guidelines for lighting at Sounder Stations and ST Express Platforms:

- Platform area lighting **SHALL** be provided in both waiting and boarding areas. The lighting system **SHALL** extend the entire length of the platform and **SHALL** demarcate the platform and emphasize the platform edge, vertical vehicle surfaces, and landings associated with elevators and stairs.

- Care **SHALL** be taken in locating and directing lighting at platforms to avoid blinding Sounder train engineers and ST Express bus operators or other vehicle operators with excessive or misdirected lighting. Designers **SHALL** reference Sound Transit Track and Signal Standards. In consultation with the Project Manager, the designer will work with Sound Transit Capital Projects staff and obtain the most current update of the agency's Track and Signal Standards.

- Luminaires and lamps to accentuate specific architectural features or art **SHALL** be selected by the designer from the standard luminaire/lamp palette, or may be designed or specified by the project designer, if approved by Sound Transit.

12.10 Control of Lighting Systems

The following are design standards and guidelines for control of lighting systems:

- The lighting control system **SHALL** be designed to use energy efficiently. Automatic and manual control arrangements **SHALL** ensure efficient use of energy and simplify maintenance procedures. All exterior site areas **SHALL** be artificially illuminated when ambient illuminance drops below 10 foot-candles at the ground plane.

- During night-time/non-revenue hours, security lighting **SHALL** be provided as required to deter crime and vandalism. (Non-revenue hours are the period from 30 minutes after service stops to 30 minutes before service starts.) Provision

SHALL be made for astronomical/time clock and photo-sensitive override. Ancillary areas **SHALL** be individually switched.

- For energy conservation, the use of day lighting is encouraged. Where daylight is used to supplement electric lighting, designers should evaluate lighting zones that can be effectively illuminated using daylight and design the lighting control system using appropriate photoelectric/electric controls.

12.11 Emergency Power and Lighting

Following are standards and guidelines for emergency power and lighting:

- Emergency lighting in enclosed indoor and underground transit facilities **SHALL** consist of appropriately located luminaires that will provide adequate lighting for the orderly egress of patrons and employees during a power failure. Emergency lighting **SHALL** be powered by batteries.

- Emergency lighting for stairs **SHALL** be designed to emphasize the top and bottom steps or landings.

- In case of power failure, luminaires providing emergency lighting for all exit, egress, and essential directional signage **SHALL** be powered by an emergency power source.

The lighting and wiring system **SHALL** meet applicable requirements of NFPA 130, NFPA 101, and the National Electrical Code. All can be purchased at the NFPA website.

Chapter 13 – Communications and Technology

Chapter 13 presents standards and guidelines for the inter-related topics of communications and technology. Many of the communications and technology elements discussed below support passenger information, passenger convenience, and safety and security infrastructure at transit and commuter rail facilities.

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

It should be noted that most of the systems discussed in this chapter are typically procured and installed outside of the facility construction contract. This section provides guidance on the selection and installation of appropriate communications and technology infrastructure.

Sounder stations have a single, integrated communications system and device control, with the exception of ticket vending machines (TVMs) and payphones. This system was designed and implemented in 2005 and will be the basis for future station construction. Systems for parking garages and ST Express transit facilities are similar to the Sounder system but may use a different communication mode or system based on their functional or physical requirements.

Several principles **SHALL** govern the design of communications and technology facilities at Sounder and ST Express facilities. These are:

- There **SHALL** be consistency of passenger information, passenger convenience, and safety and security devices with Sound Transit's Technology Plan. Designers will obtain the most current version of the Technology Plan from the Sound Transit project manager.

- Static and variable message signage related to passenger information, passenger convenience, and safety and security **SHALL** be provided at all new Sound Transit Sounder and ST Express passenger facilities.

- To accommodate existing and planned technology requirements, the designer **SHALL** provide appropriate excess capacity in the conduit system.

Chapter 13 is divided into the following sections:

13.1 Design Process for Technology Infrastructure

Final designs **SHALL** incorporate the physical space and connections to enable future technologies to be easily integrated into facilities. Sound Transit's various programs and divisions (such as research and technology, information technology, customer service, operations, and safety and security) **SHALL** be consulted during the design process to ensure that current and future technology needs, such as the appropriate conduit infrastructure, are integrated into the design.

Typically, the procurement and installation of such technologies are completed independently of facility construction. "Lessons learned" from previously designed projects indicate that, in some cases, conduit has been removed from the design or reduced in size during value engineering because its importance was not clearly emphasized or documented. Additionally, requirements for communications to remote facilities are important to identify and resolve prior to the final design of each facility where technology is to be deployed.

While the technologies listed below are commonly used today, additional ones may be used in the future for passenger information, fare collection, and safety and security. In order to accommodate those additional technologies, the power and communications duct bank **SHALL** provide appropriate conduits with inner duct so that additional cables can be pulled.

Additionally, all shelters and light standards **SHALL** have conduit stub ups from the mainline duct bank for power and system communications. Often, shelters and light standards are used to mount passenger information and safety and security devices. Installation costs for those devices can be dramatically reduced if the power and communications infrastructure is installed nearby (and saw cutting and pavement restoration is minimized or eliminated).

Appendix A, Exhibit A-14 includes an example of facility duct back and conduit detail. This example is from a drawing for the South Tacoma Sounder station.

13.2 Functional Descriptions

The following provide functional descriptions of communications and technology elements for Sounder and ST Express facilities.

13.2.1 Sounder Facilities

The current (2006) Sounder communications system includes seven passenger stations and a communications control center at Union Station. The stations are:

- King Street
- Tukwila
- Kent
- Auburn
- Sumner
- Puyallup
- Tacoma Dome
- Union Station communications control center

The communications system is composed of the following elements:

- Closed Circuit Television (CCTV)
- Passenger Information Management System (PIMS)
- Automatic Vehicle Location (AVL) System
- Communications Transmission System (CTS)
- Customer Emergency Stations (CES)

13.2.1.1 Closed Circuit Television (CCTV) System

The CCTV system is composed of fixed and pan-tilt-zoom (PTZ) cameras at each station, a Digital Video Recorder (DVR) at each station, and a video monitoring workstation at Union Station. The video from the cameras is digitized at the DVR. Each DVR is connected to the CTS so that real-time or recorded video can be viewed at the video monitoring workstation. PTZ cameras can also be controlled from this workstation. Video can be monitored from multiple cameras and multiple stations simultaneously, as selected from the workstation.

Further information on CCTV cameras is presented in Section 13.3. This information includes cameras for Sounder and ST Express facilities.

13.2.1.2 Passenger Information Management System (PIMS)

The PIMS is composed of Public Address (PA) and Variable Message Sign (VMS) systems at each station. The PIMS is controlled from Union Station. The system provides for three types of announcements. Scheduled PA (audio) and VMS (visual)

announcements are synchronized. The third type of announcement – train arrival times – is automatically generated, based on current locations of trains as determined by the AVL system.

The PIMS includes audio and VMS onboard trains. The onboard AVL equipment triggers onboard announcements of upcoming stops. The existing PA equipment is being utilized and new VMS are being installed. Audio and text files for the announcements are stored onboard.

13.2.1.3 Automatic Vehicle Location (AVL) System

The AVL system is composed of equipment onboard the trains and a software application at the communications control center. Vehicle location is determined by Global Positioning Satellite (GPS) receivers onboard each control car. A processor onboard each control car, called the Vehicle Logic Unit (VLU), tracks location along the rail line and generates announcements at "trigger points" in advance of each station. The VLU also reports locations via a cellular data modem. The AVL server (at Union Station) receives the location updates and uses this information to update train locations on a map display and provide location information to the PIMS software application for generating announcements at stations.

13.2.1.4 Communications Transmission System (CTS)

The CTS is a Gigabit Ethernet system. A Gig-E switch is installed at each station and at Union Station. Communications between locations is via fiber optic cable. Each Gig-E switch interfaces to the local devices via multiple 10/100 Ethernet ports. The Gig-E system is configured as a ring and uses Spanning Tree Protocol (STP).

13.2.1.5 Customer Emergency Stations (CESs)

This section provides an overview of CESs. For specific guidelines on CESs, see Section 13.4. CESs are Americans with Disabilities Act (ADA)-compliant call boxes. CESs are being provided at each Sounder station. When a customer activates the CES by a pushbutton, the CES generates a call to a pre-programmed number. If there is a PTZ camera in the vicinity of the CES, the PTZ camera will automatically train to the CES.

The CESs are being interfaced with the CTS via a Voice over Internet Protocol (VoIP) gateway. The calls will be routed to an extension of the existing Sounder VoIP telephone system (Cisco Call Manager).

At Union Station, the equipment includes a server rack and a console. The server rack houses the head-end of the CTS and the servers for PIMS and AVL. The console includes three monitors for viewing CCTV and two monitors for PIMS and AVL along with associated processors and peripherals.

Further information on CESs is provided in Section 13.4 of this chapter of the manual.

13.2.2 ST Express Facilities

Communications at ST Express facilities that will not also be served by Sounder will involve local monitoring. The following communications and technology-related elements should be anticipated at these facilities:

- Closed Circuit Television (CCTV) (see Section 13.3 for guidelines)
- Customer Emergency Stations (CESs) (see Section 13.4 for guidelines)

The CCTV system will be composed of fixed or PTZ cameras at each facility, a Digital Video Recorder (DVR) at each facility, and a video monitoring workstation. Monitoring work stations may be located at the facility or at remote locations such as a police department.

For bus-only facilities served by ST Express, CESs will be provided in parking garages. When a customer activates the CES by a pushbutton, the CES will generate a call to a pre-programmed number. If there is a PTZ camera in the vicinity of the CES, the camera will automatically train to the CES.

13.3 Closed Circuit Television (CCTV) Cameras

The following describe functional descriptions of closed circuit television (CCTV) elements for Sounder and ST Express facilities.

13.3.1 Sounder Facilities

CCTV cameras are installed at seven south-line Sounder stations with central monitoring provided at Sound Transit headquarters. The designer **SHALL** review the latest standards governing location and other requirements relating to CCTV.

CCTV cameras may be installed in parking garages that support Sounder facilities. The number of cameras in garages will likely exceed the number of cameras at a station's boarding platform. As video images require a fair amount of bandwidth to transmit and the number of cameras is large, it is most likely that cameras in a parking garage will be monitored locally.

Sound Transit's Security and Facilities Division will support and administer the day-to-day operations and monitoring of Sounder CCTV cameras. Additionally, the Security and Facilities Division will be responsible for maintaining and upgrading the Sounder CCTV cameras.

Currently, Sound Transit Security subcontracts to a private security provider to staff security officer positions. Consistent with current operations, it is expected that the private security agency staff will monitor Sounder's CCTV cameras.

The following are standards that **SHALL** be followed in the design of CCTV camera systems for Sounder stations:

- Cameras **SHALL** be color, vandal resistant, weather resistant, fixed position and/or Pan-Tilt-Zoom (PTZ). Cameras with specific coverage of the CESs shall be PTZ.

- Video images **SHALL** be recorded continuously and the images **SHALL** be indexed by date and time. Recordings **SHALL** be stored digitally for a period of 72 hours uncompressed and digitally compressed for a period of 30 days.

- Recording method **SHALL** be an industry standard, non-proprietary format that includes the ability to digitally authenticate recording by an acceptable method to validate recording for use in a court of law. The design **SHALL** use the current Sound Transit Standard digital video recorder to allow for viewing at both remote and centralized locations. Digital authentication method may be proprietary.

- Sounder platform and surface parking lot video images and time-indexed recordings **SHALL** be available by query from the temporary SCC and permanent O&M Facility by Sounder CCTV operator and designated security, fire/police, or operational personnel. Sounder parking garage video images and time-indexed recordings **SHALL** be available by query at the Sounder station.

- Sounder stations **SHALL** be designed to include all conduit runs from proposed camera sites to communications shelter facilities. Outlet boxes for power and control of the system for future CCTV cameras **SHALL** be provided.

- The contractor **SHALL** be responsible for verifying the field conditions to determine if the pull boxes, junction boxes, and conduits have been installed.

In general, the Sounder station platform and ticket vending machines (TVMs) **SHALL** be within direct range of the CCTV cameras. Also, CCTV camera locations **SHALL** be coordinated with the location of other equipment such as lighting, public address speakers, and signage. The field of view of the CCTV cameras **SHALL** be adequately illuminated by natural light or by luminaires. Within the field of view, particular care **SHALL** be taken to avoid extremes of light and shadow.

The facility cameras may be monitored locally or remotely (at a central facility). Therefore, for parking garages, space for a potential security office/monitoring facility should be included in the design. Section 6.2 of Chapter 6 provides further guidance relating to security facilities.

The security office/monitoring facility may be located within the garage or at the transit/commuter rail facility. The security office should not be located in the communications room/building, but should be connected to the communications room/building via the power and communications duct bank.

13.3.2 ST Express Facilities

CCTV cameras may be installed in parking garages that support ST Express facilities. The number of cameras in garages will likely exceed the number of cameras at the

boarding platforms. As video images require a fair amount of bandwidth to transmit and the number of cameras is large, it is most likely that the cameras in a parking garage will be monitored locally.

The facility cameras may be monitored locally or remotely (e.g. at a police station). Therefore, for parking garage planning, space for a security office/monitoring facility should be included in the design. Section 6.2 of Chapter 6 provides further guidance relating to security facilities.

The security office/monitoring facility may be located within the garage or at the transit/commuter rail facility. The security office should not be located in the communications room/building, but should be connected to the communications room/building via the power and communications duct bank.

13.4 Customer Emergency Stations

Customer emergency stations (CESs) are used by patrons to alert security personnel of possible emergencies. CESs are anticipated at both Sounder and ST Express facilities.

The following sections describe standards and guidelines for CESs:

- Any CES **SHALL** include a speaker and microphone so that patrons can speak to security personnel.
- A pan-tilt-zoom (PTZ) or fixed CCTV camera **SHALL** be mounted near the CES so that when the CES is activated, the PTZ camera swings to a preset location (or the fixed camera continues to view the CES) so that the security officer can see the person who activated the CES. Other cameras at the facility may be used to view the incident.
- The quantity and location of CESs **SHALL** be approved by Sound Transit's safety and security staff.
- Consistent with existing Sounder facilities, the CES **SHALL** have *Safety Red* as the color.
- Consistent with existing Sounder facilities, the CES **SHALL** use *Code Blue* equipment.
- CESs **SHALL** emit a flashing light and alert security personnel. The flashing light should be independently wired and alarmed so that an individual activated CES can be identified by security personnel.

- Each CES **SHALL** have a sign mounted on it that identifies the floor and section in which it is located (e.g., "Floor 3, NW Section").

- CESs **SHALL** be located such that they are accessible to all users, including those in wheelchairs. [For a copy of Sound Transit's Accessibility Design Standards and Guidelines, the designer should send a request to accessibility@soundtransit.org.]

- CESs **SHALL** be located within the view of a PTZ or fixed camera.

- CESs **SHALL NOT** be connected directly to the 911 system, since false alarms can occur.

13.5 Public Telephones

Phones provide a customer amenity while also serving as an added security feature. Payphones **SHALL** be installed and maintained by the local telephone company. Following are standards and guidelines for public telephones:

- Public payphones **SHALL** be provided on all boarding platforms at Sounder stations and ST Express facilities (except for on-street bus zones). The design **SHALL** allow for an extra, dedicated communications conduit in the duct bank for the payphone.

- Finishes, fixtures, and equipment **SHALL** be selected and specified assuming the following maintenance regimen: weekly sponge and mildly abrasive pad cleaning of the phone surfaces using cleaning and disinfectant chemicals is anticipated. All surrounding surfaces within possible public contact should be readily accessible for cleaning and disinfectant. Graffiti removing chemicals will be used.

- Payphones and accompanying fixtures should last at least ten years. Surface texture and treatments **SHALL** minimize the potential for applied and etched graffiti. Phones will need to be quickly removed, repaired, and replaced, or easily repaired on-site, if subject to vandalism.

- While it is Sound Transit's ideal to maximize accessibility, some sites may not be suitable for a public payphone with a Teletypewriter (TTY) device. When two or more public payphones are provided, one TTY device **SHALL** be provided if it is determined the site has an acceptable enclosed or sheltered area in which to locate the TTY device.

- Accompanying fixtures, if required, **SHALL** use non-ferrous metals, porcelain or heavy duty coated metals, stout plastics, concrete, and/or hot dipped galvanized steel materials. Heavy gauge metal and/or sheet metal using stout backer boards are desired. Accompanying fixtures using wood, light weight plastics without backing boards, sheet metal skins without backing boards, and other materials that are easily subject to vandalism are not acceptable.

13.6 Staff Telephones

For facilities with dedicated customer service personnel, voice communications should be part of the design. Generally speaking, security personnel use radio communications (walkie-talkies and mobile telephones) for voice communications, not staff telephones.

13.7 Variable Message Signs (VMS)/Passenger Information Systems

The following describe standards relating to variable message signs (VMS) for Sounder and ST Express facilities:

13.7.1 Sounder Facilities

For Sounder facilities, the designer **SHALL**:

- Provide initial and future locations and conduit needs for VMS.
- Provide placement of real-time information consistent with design standards and guidelines developed.

VMS along with PA systems are included in the overall PIMS at each station. The PIMS is controlled from Union Station. The system provides for scheduled announcements, manually selected announcements, and ad-hoc announcements. PA (audio) and VMS (visual) announcements are synchronized. Train arrival announcements are automatically generated, based on current locations of trains as determined by the AVL system.

13.7.2 ST Express Facilities

ST Express facilities may or may not have a VMS. Therefore, once it has been determined that an ST Express facility is a candidate for a VMS, the design should incorporate:

- Initial and future locations and conduit needs.
- Provide for the placement of real-time information consistent with design standards and guidelines developed.

ST Express facilities will not have PA systems.

Transit coaches will be outfitted with automatic vehicle location (AVL) system devices that will feed information into a real-time arrival tracking/prediction system. Ultimately, the VMS will display an arrival countdown for the next coaches.

13.8 Public Address (PA) System

Public address (PA) systems are a series of speakers located throughout public areas that can carry recorded and real-time announcements produced on site or at a central location.

The following describe design standards and guidelines for Sounder and ST Express facilities.

13.8.1 Sounder Facilities

PA systems **SHALL** have the capability to be activated through the PIMS, composed of PA and VMS systems at each station. The PIMS is controlled from Union Station. The system provides for scheduled announcements, manually selected announcements, and ad-hoc announcements. PA (audio) and VMS (visual) announcements are synchronized. Train arrival announcements are automatically generated, based on current locations of trains as determined by the AVL system.

Following are standards and guidelines for PA systems:

- Public address systems **SHALL** be provided at Sounder stations. The designer **SHALL** provide sufficient conduit capacity to support a series of speakers located throughout public areas that can carry recorded and real-time announcements produced on site or at a central location.

- The systems **SHALL** be heard throughout the entire waiting area. The systems **SHALL** have a volume that exceeds the prevailing ambient sound by at least 15 decibels and exceeds any maximum sound level with duration of 60 seconds by at least 5 decibels.

- Security personnel can also use the PA system to deter persons from committing crimes. Employees, both on site and at a remote location, should be able to make announcements over the public address system.

- The PA system should include a dedicated communications conduit system, because the speakers are driven by a 70-volt system. PA communications cables cannot share conduit with other low-voltage communications cables (e.g. Category 5, Category 5e, Category 6, or coaxial cable).

13.8.2 ST Express Facilities

- For ST Express facilities, the designer **SHALL** provide sufficient conduit capacity to allow a series of speakers located throughout public areas that can carry recorded and real-time announcements produced on site or at a central location.

- Security personnel can also use the PA system to deter persons from committing crimes. Employees, both on site and at a remote location, should be able to make announcements over the public address system.

- The PA system should include a dedicated communications conduit system, because the speakers are driven by a 70-volt system. PA communications cables cannot share conduit with other low-voltage communications cables (e.g. Category 5, Category 5e, Category 6, or coaxial cable).

13.9 Ticket Vending Machines (TVM)

Design and installation of ticket vending machines (TVMs) will occur under separate contracts. However, the designer of Sounder stations **SHALL** coordinate with Sounder staff on the most recent design and installation requirements for ticket vending machines.

13.10 Smart Card Readers

Smart Card readers are expected to be installed at Sounder facilities only. The designer shall coordinate efforts with the Stand-Alone Fare Transaction Processor (DR 106A) - Hardware Specification prepared as part of the Central Puget Sound Regional Fare Coordination System.

13.11 Static Signage

While not critical to communications and technology infrastructure planning, static signing (i.e., traditional fixed signs) **SHALL** be installed at Sounder and ST Express facilities with video and/or audio surveillance. The signs will inform patrons that they are under video and audio surveillance and that they may be recorded.

The exhibit on the right provides an example of this type of static signing.

13.12 Communications and Electrical Room/Building

The size of the room/building should be sufficient to accommodate connections for passenger information, passenger convenience, and safety and security systems. The room/building **SHALL** be a minimum 10 foot by 12 foot.

Appendix A, Exhibit A-15 provides an example of a communications building floor plan (Sumner Sounder Station).

13.13 Wireless Data Infrastructure

For customer convenience, Sound Transit could consider providing wireless Internet access (Wi-Fi) at stations and on vehicles. Wireless transmitting and receiving devices (access points) require a power source and communications backbone. Accordingly, conduits to provide power and communications to wireless access points should be included in the facility design. Coordination with Sound Transit information technology personnel **SHALL** be done at each facility to accommodate Wi-Fi.

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Chapter 14 – Electrical

This chapter presents standards and guidelines for electrical items that are provided at ST passenger facilities.

Standards versus Guidelines

This manual contains both standards and guidelines.

- **Standards**, designated with the word **SHALL**, indicates a required direction for a particular design feature.
- **Guidelines**, designated with the word ***should***, are intended to provide a preferred but not necessarily required direction for a particular design feature.

14.1 Fire Life Safety Systems

Electrical systems will need to recognize both current and potential future requirements for fire, life, and safety systems. Fire alarm control panels should be non-proprietary and include digital-addressable systems. These systems should be capable of handling at least 35 percent more circuits than what will be required by initial project needs.

14.2 Electrical Items for STart

Design for any electrical elements included in public art **SHALL** be done by a licensed electrical engineer. The electrical work **SHALL** only include equipment that bears an *Underwriters Laboratory* label.

Any electrical equipment **SHALL** be accessible in an easy and safe manner.

14.3 Conduit Boxes

The design **SHALL** provide a junction box or gutter prior to electrical panels or fire panel. This will prevent water from reaching circuit boards and breakers. Junction boxes and gutters **SHALL NOT** be placed above panels or electrical gear. The designer **SHALL NOT** rely on sealed fittings to block water from reaching circuit boards and breakers.

14.4 Electric Fixtures

The design **SHALL** only include electric fixtures that can be purchased from multiple local vendors. Special orders or regional franchise vendors **SHALL NOT** be included.

14.4 Electrical Rooms

The design of electrical rooms **SHALL** provide adequate space for provision of future electrical panels. Electrical rooms SHALL be accessible from ground level and should be located such that a service vehicle can be parked within 20 feet. Electrical rooms **SHALL** include heating sufficient to prevent freezing and condensation.

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Appendix A – Sample Drawings for Sounder Stations

This Appendix contains small (thumbnail) versions of larger drawings. Viewers may click on each thumbnail to see an enlarged view. After clicking on a thumbnail below, viewers should click on the green Back Arrow button at the bottom of the Adobe Reader screen to return to this document.

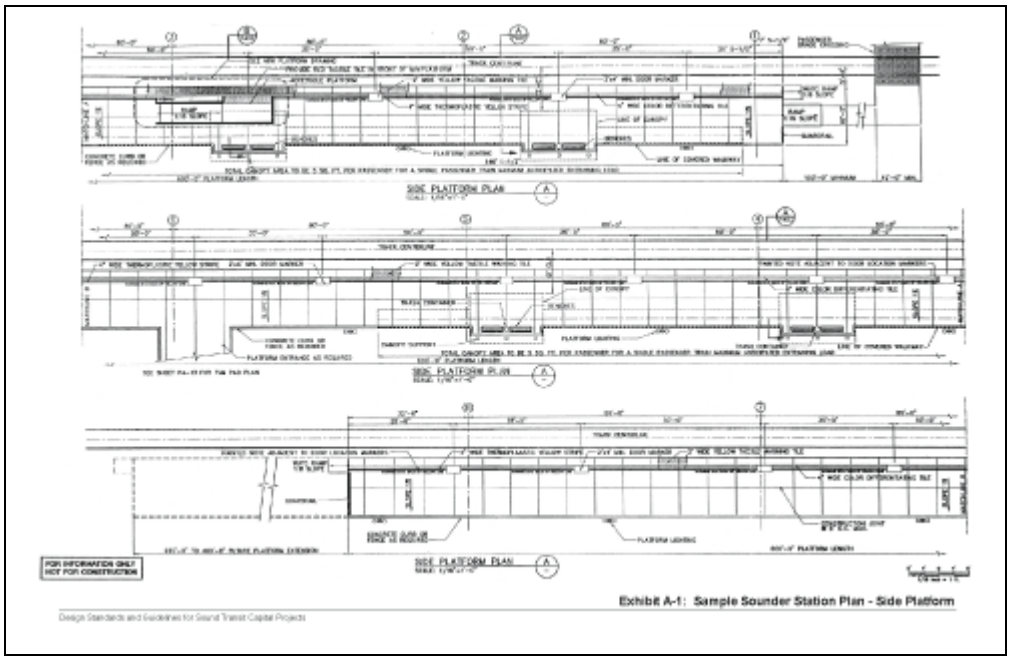


Exhibit A-1: Sample Sounder Station Plan – Side Platform (2.0 MB)

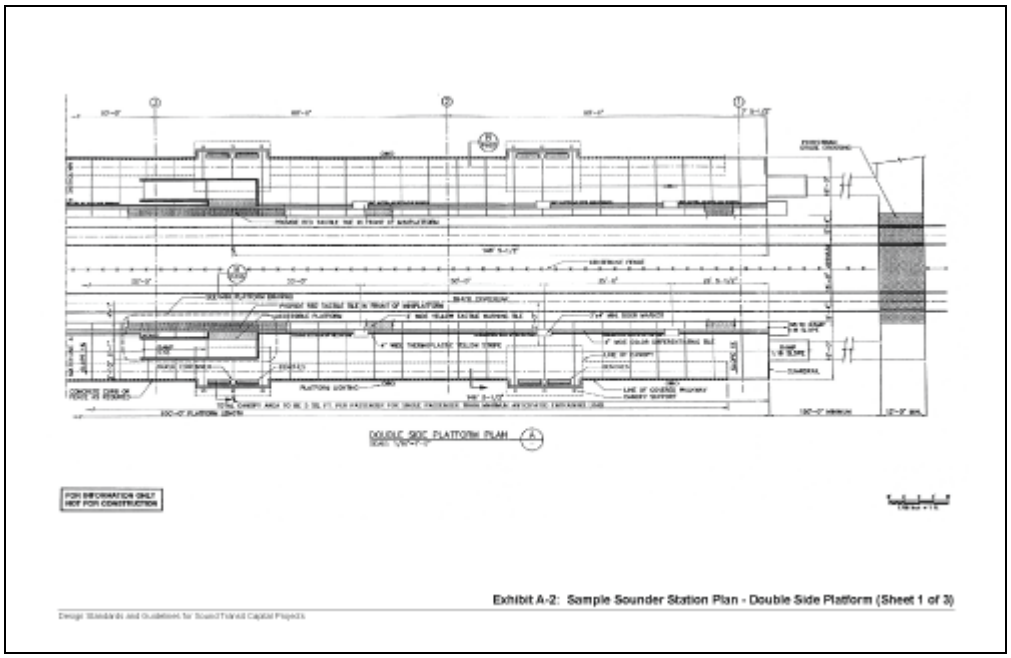


Exhibit A-2: Sample Sounder Station Plan – Double Side Platform (Sheet 1 of 3)
(1.3 MB)

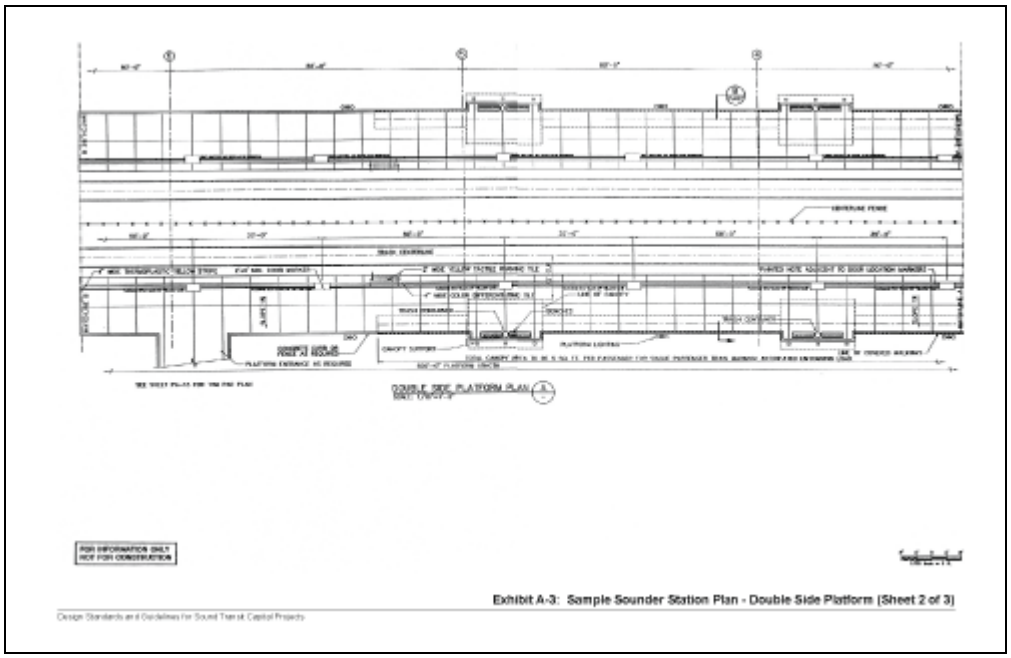


Exhibit A-3: Sample Sounder Station Plan – Double Side Platform (Sheet 2 of 3)
(1.2 MB)

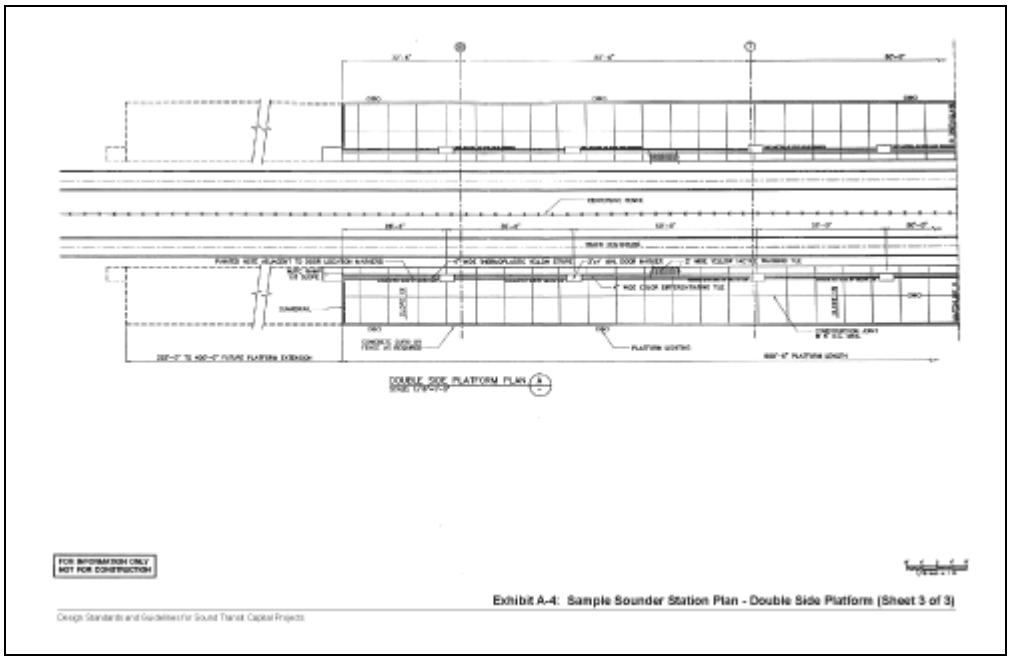


Exhibit A-4: Sample Sounder Station Plan – Double Side Platform (Sheet 3 of 3)
(3.0 MB)

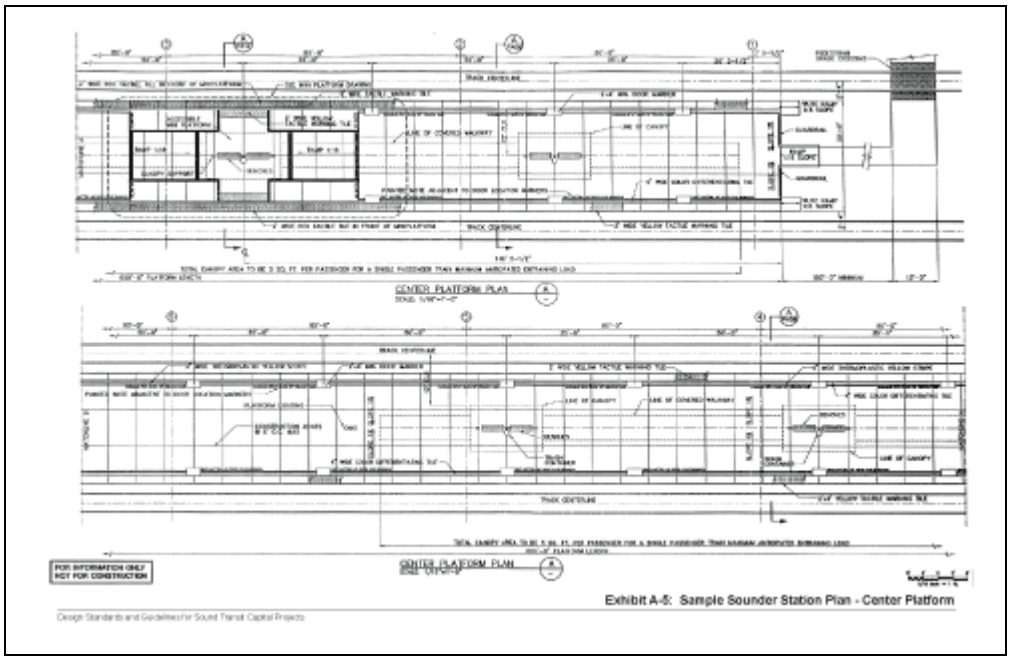


Exhibit A-5: Sample Sounder Station Plan – Center Platform (1.8 MB)

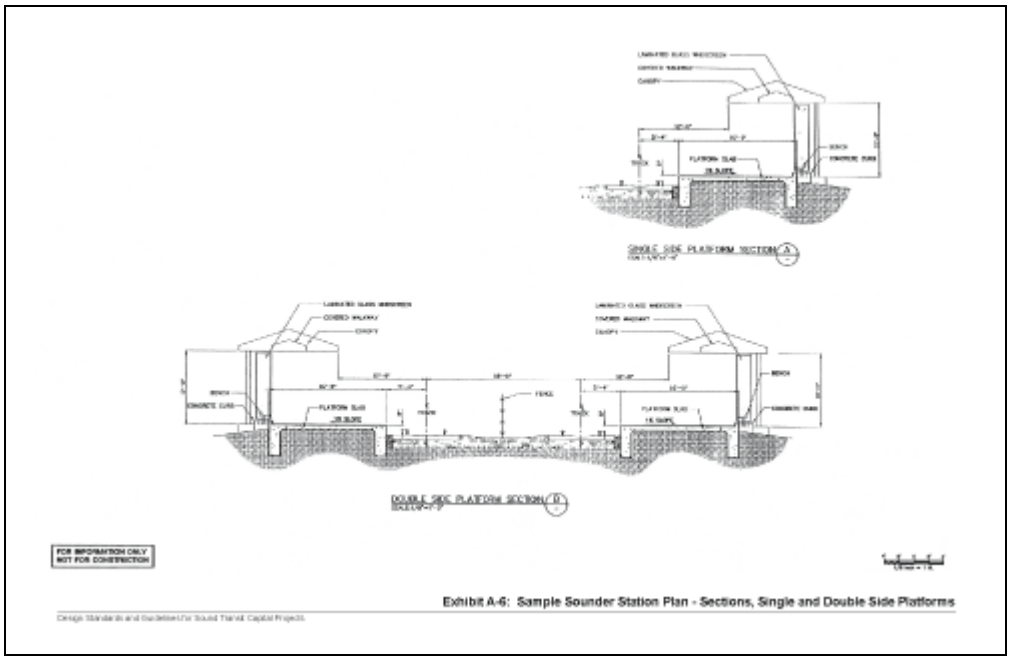


Exhibit A-6: Sample Sounder Station Plan – Sections, Single and Double Side Platforms (738 KB)

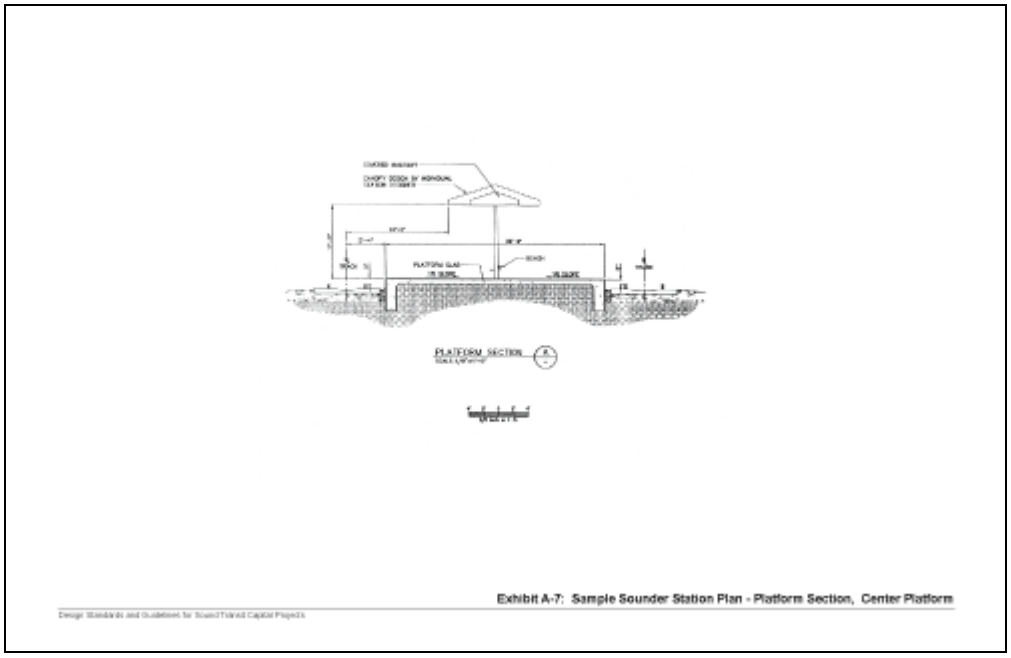


Exhibit A-7: Sample Sounder Station Plan – Platform Section, Center Platform (301 KB)

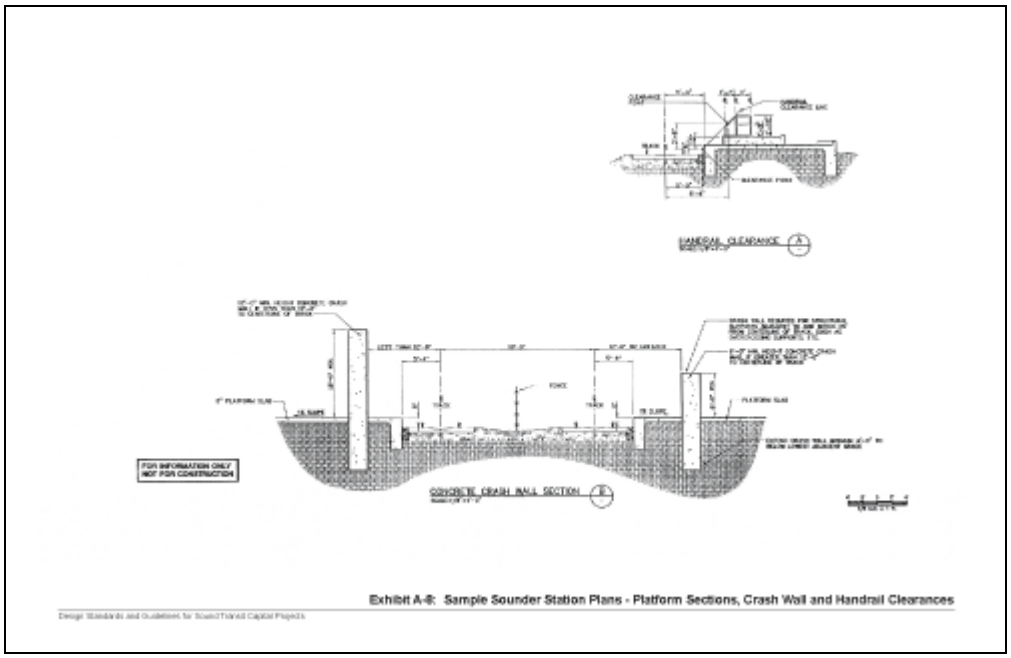


Exhibit A-8: Sample Sounder Station Plans – Platform Sections, Crash Wall and Handrail Clearances (772 KB)

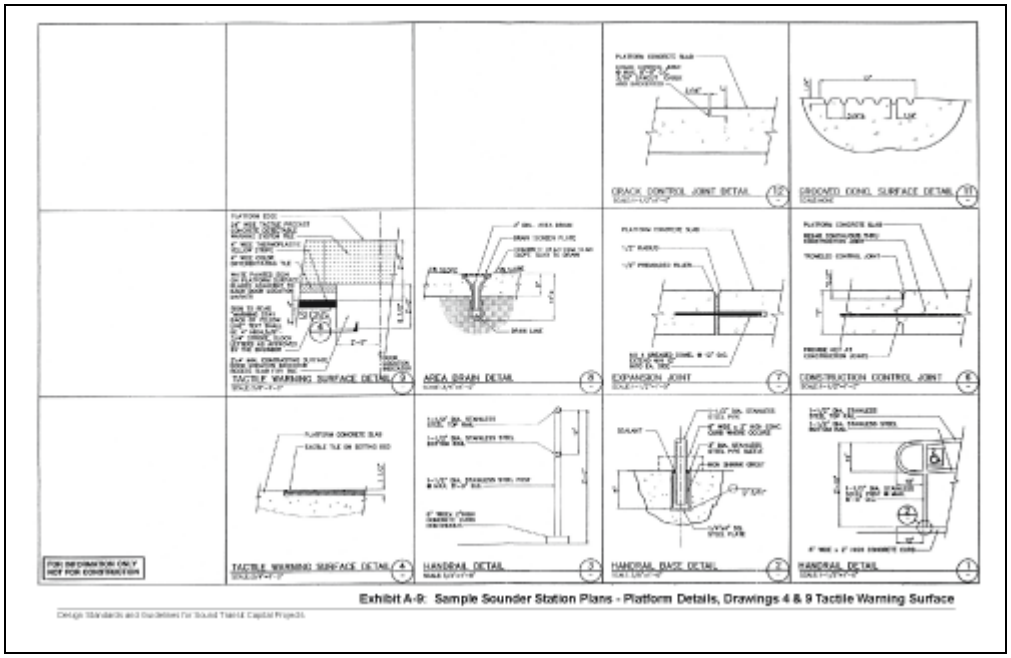


Exhibit A-9: Sample Sounder Station Plans – Platform Details, Drawings 4 & 9 Tactile Warning Surface (1.4 MB)

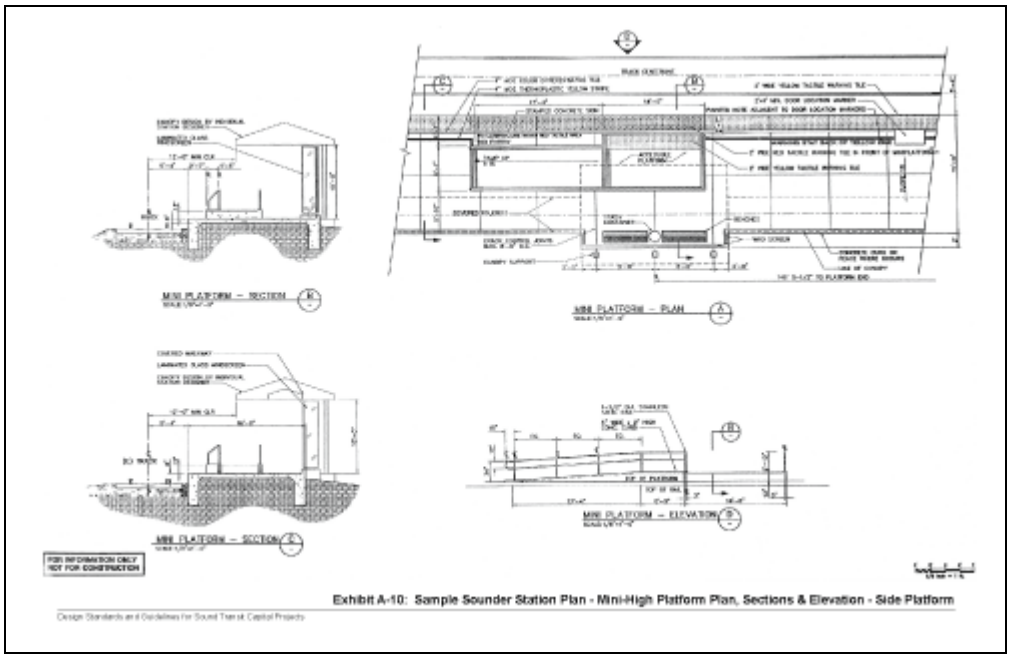


Exhibit A-10: Sample Sounder Station Plan – Mini-High Platform Plan, Sections & Elevation – Side Platform (1.4 MB)

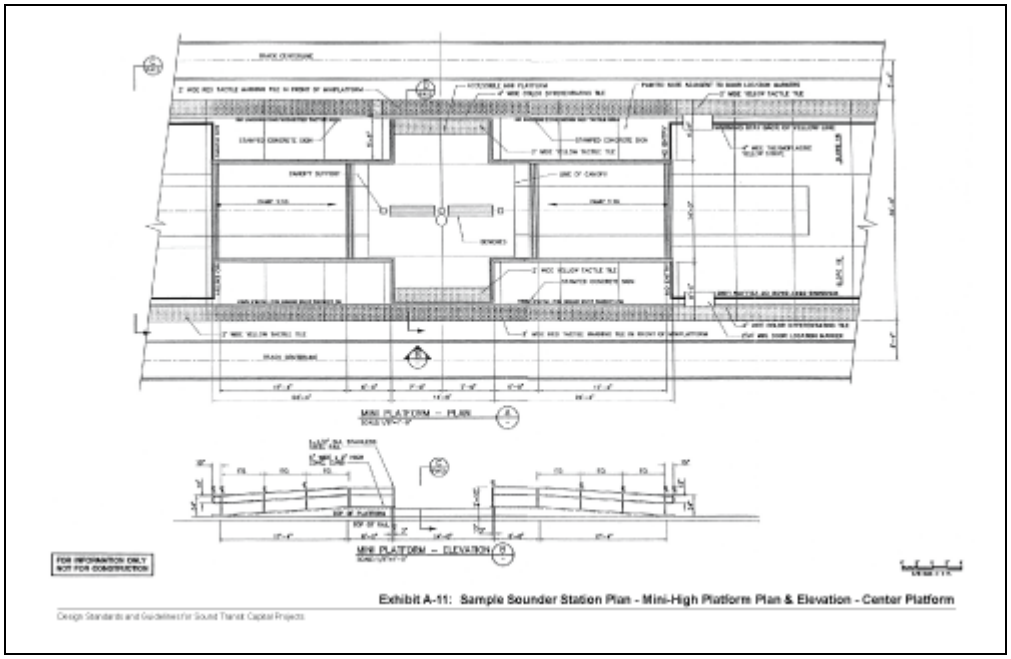


Exhibit A-11: Sample Sounder Station Plans – Mini-High Platform Plan & Elevation – Center Platform (1.8 MB)

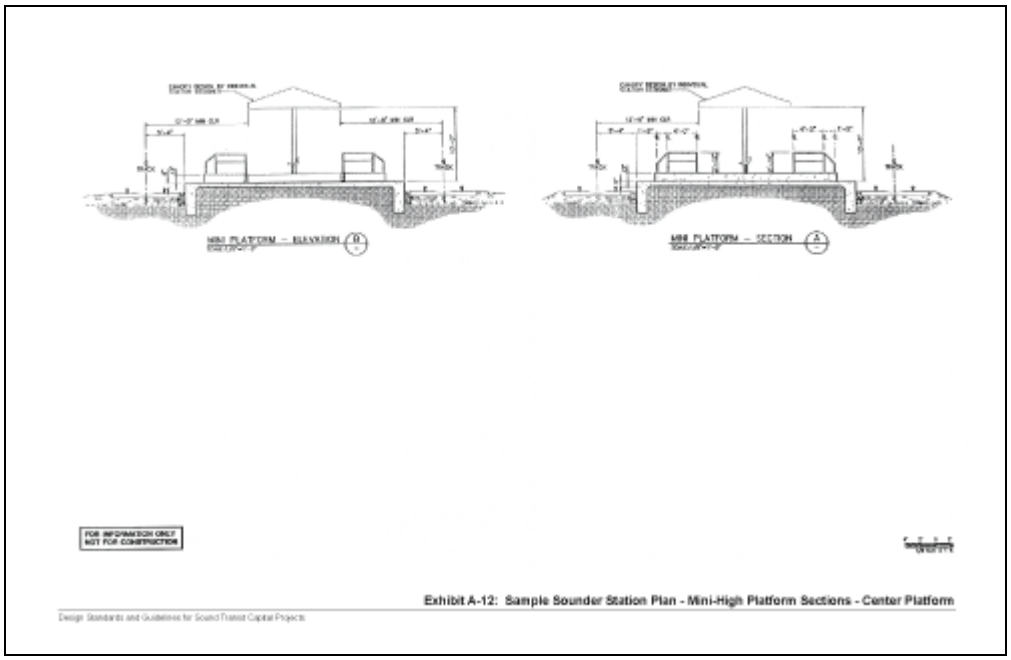


Exhibit A-12: Sample Sounder Station Plans – Mini-High Platform Sections – Center Platform (649 KB)

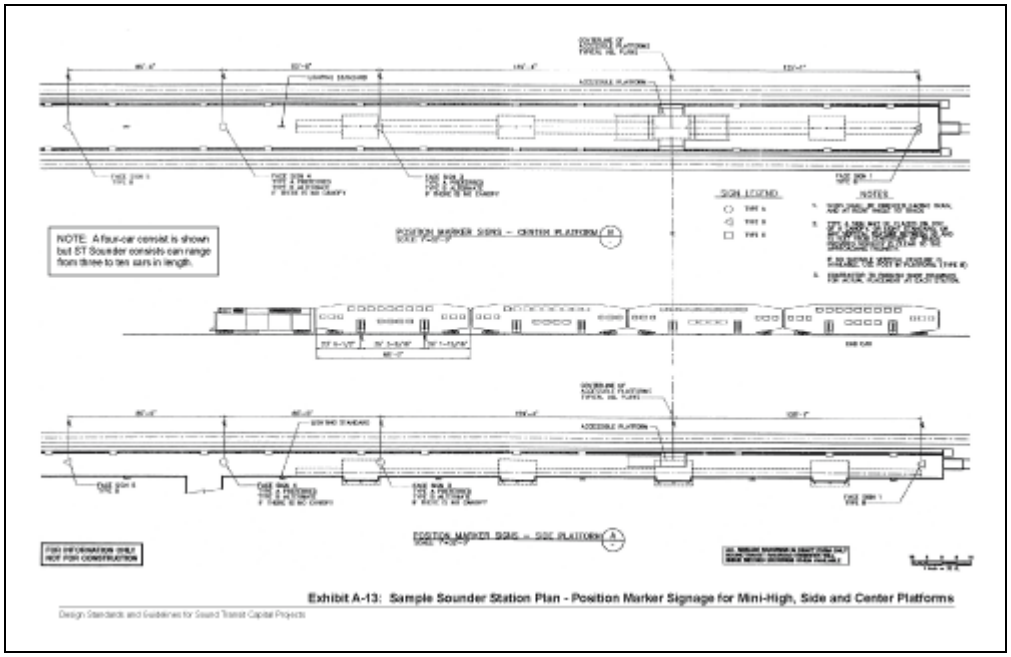


Exhibit A-13: Sample Sounder Station Plan – Position Marker Signage for Mini-High, Side and Center Platforms (1.1 MB)

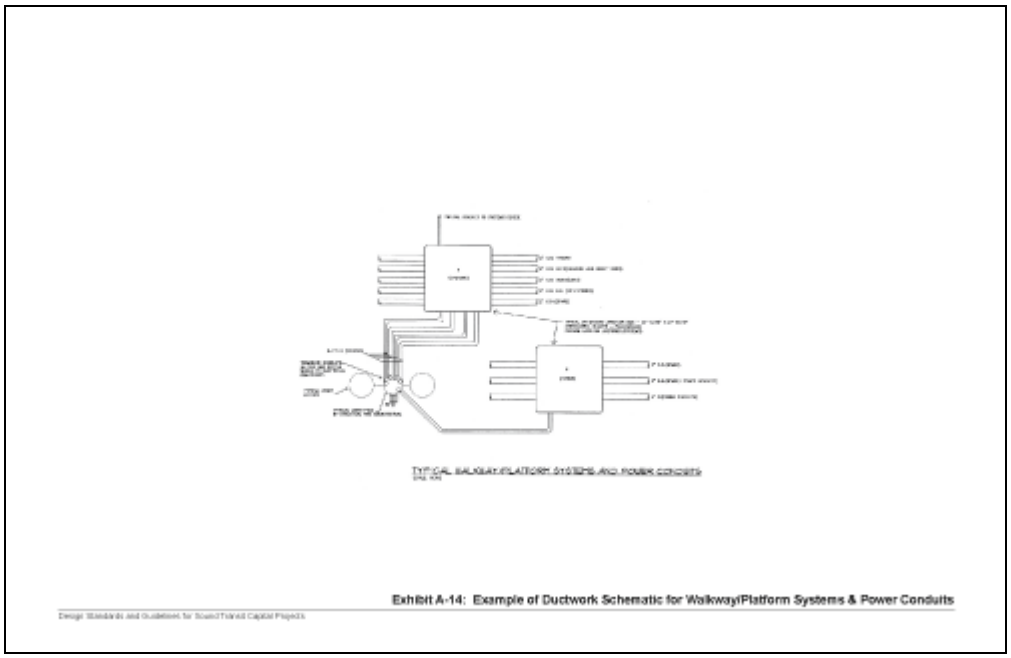


Exhibit A-14: Example of Ductwork Schematic for Walkway/Platform Systems & Power Conduits (237 KB)

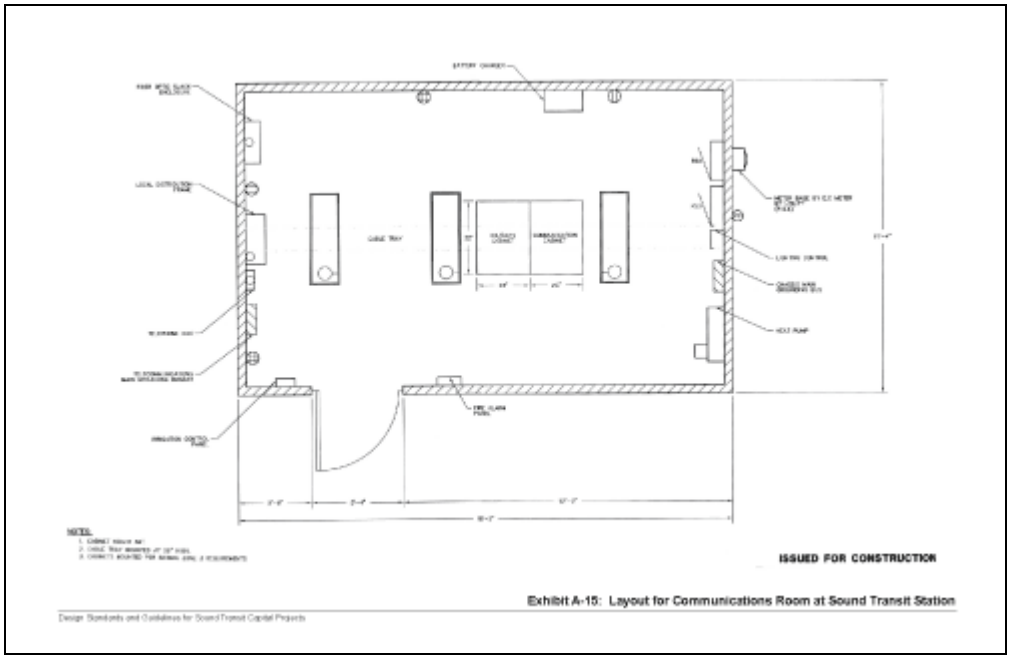


Exhibit A-15: Layout for Communications Room at Sound Transit Station (600 KB)

Appendix B – Bus Turning Radii (for various bus speeds)

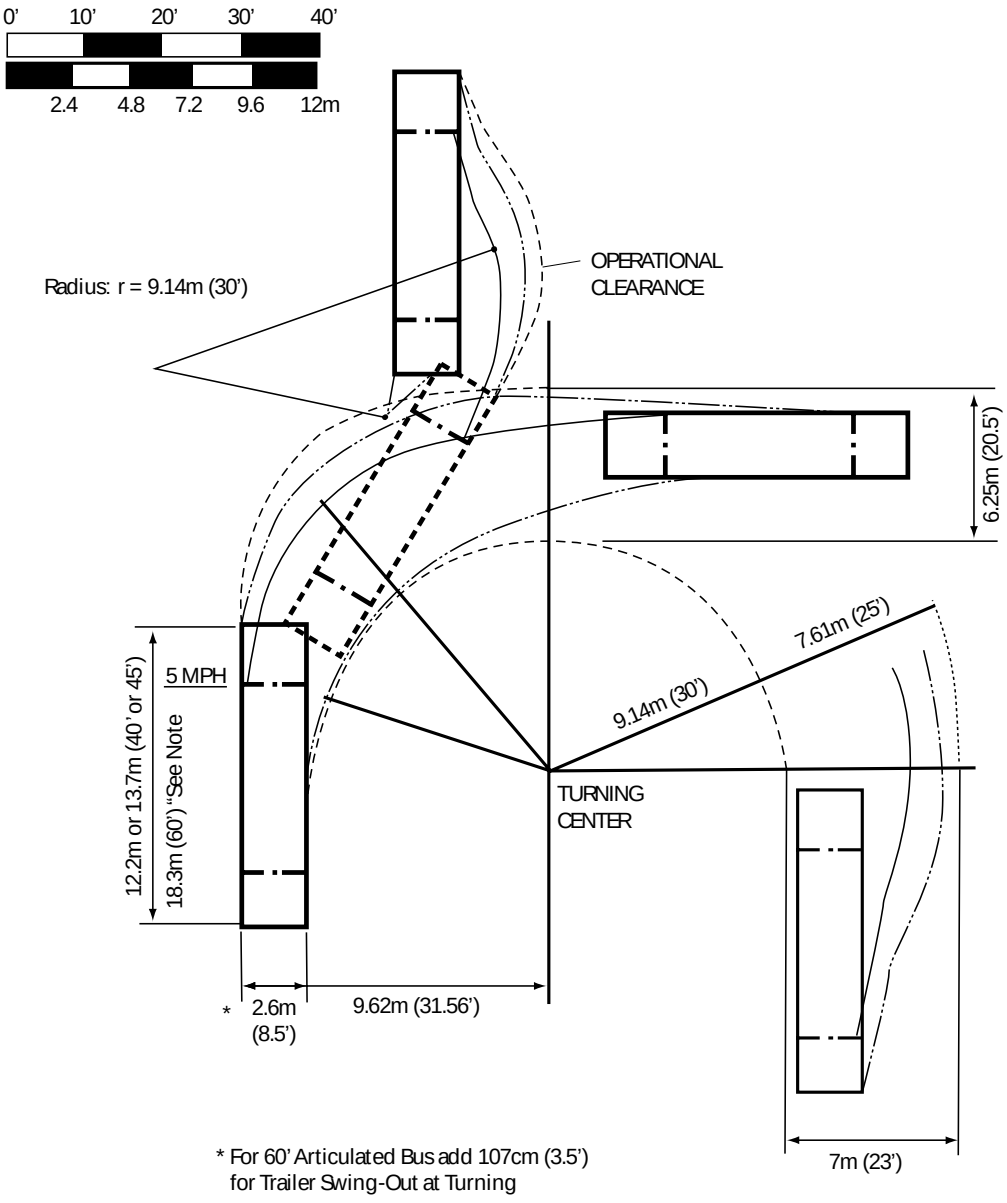


Exhibit B.1 - 5 mph Bus Turning Template

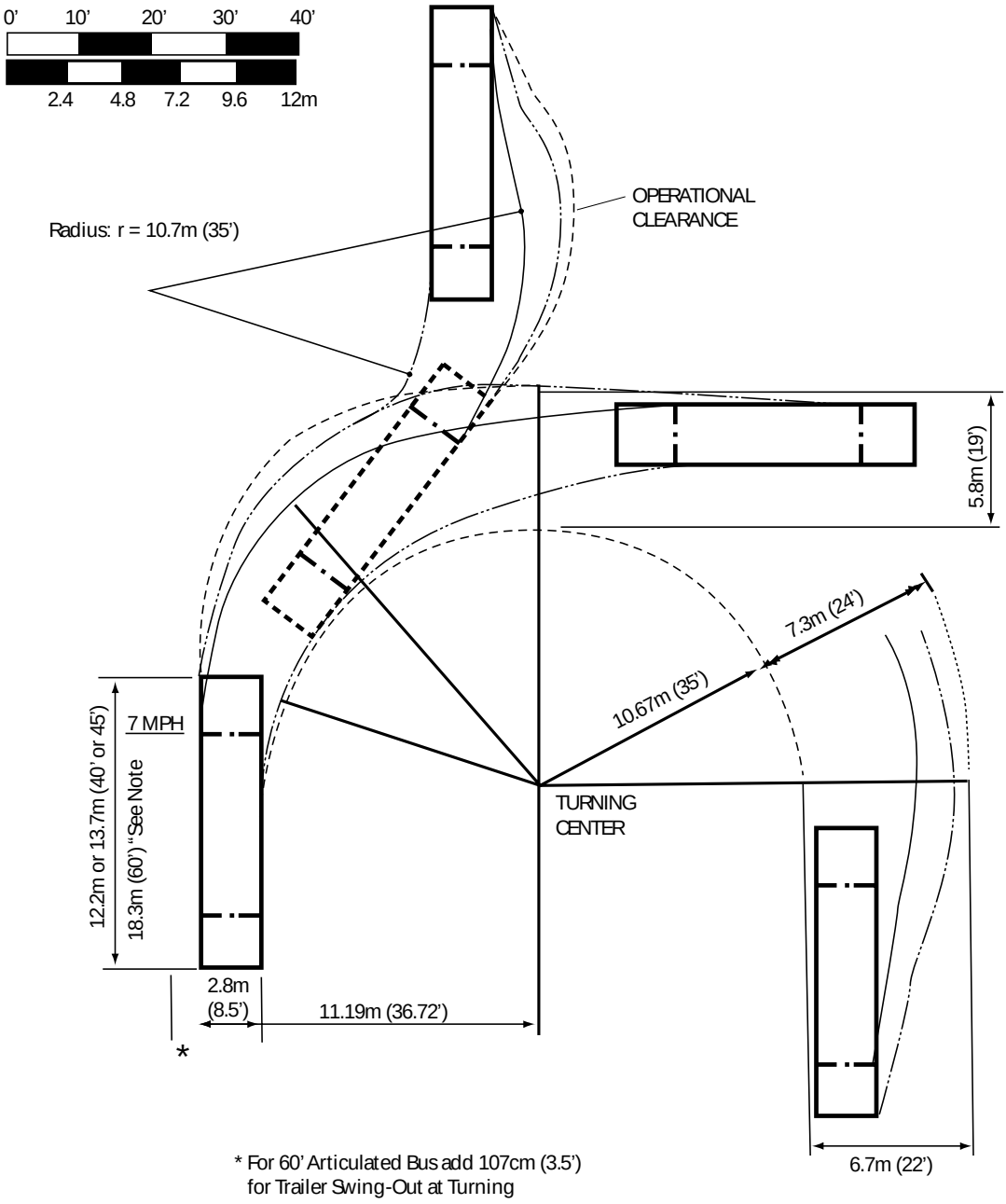


Exhibit B.2 - 7 mph Bus Turning Template

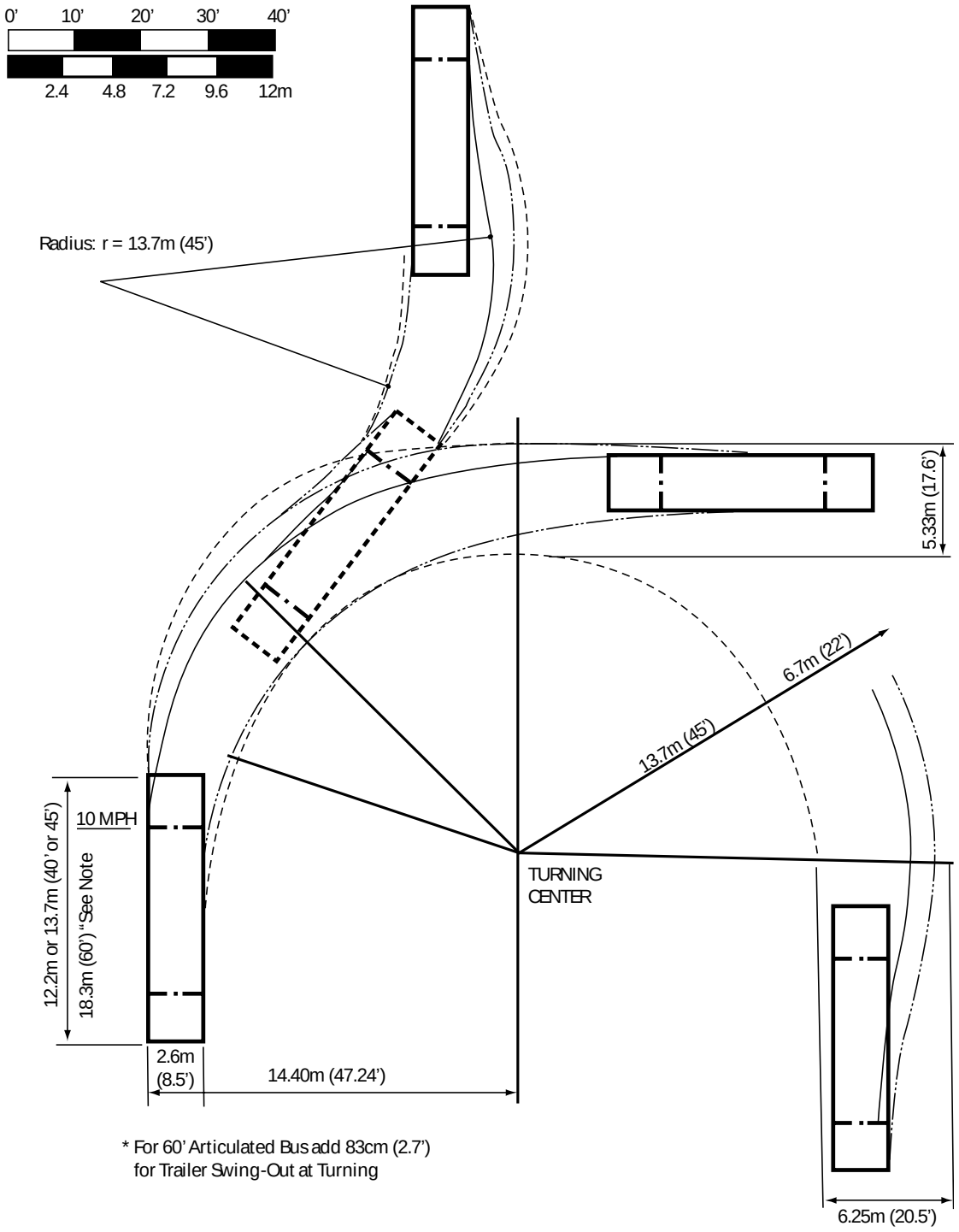
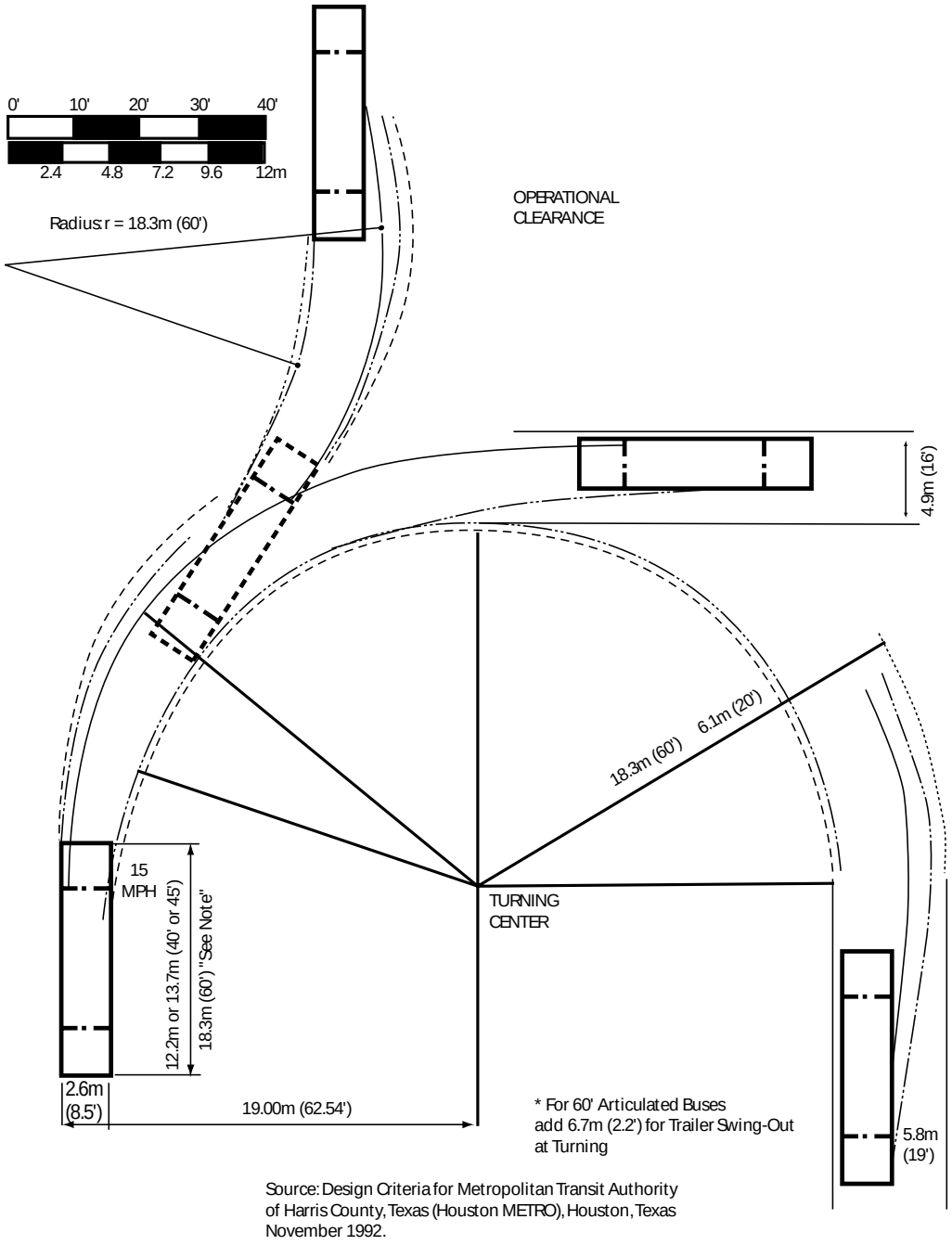


Exhibit B.3 - 10 mph Bus Turning Template



Source: Design Criteria for Metropolitan Transit Authority of Harris County, Texas (Houston METRO), Houston, Texas November 1992.

Exhibit B.4 - 15 mph Bus Turning Template

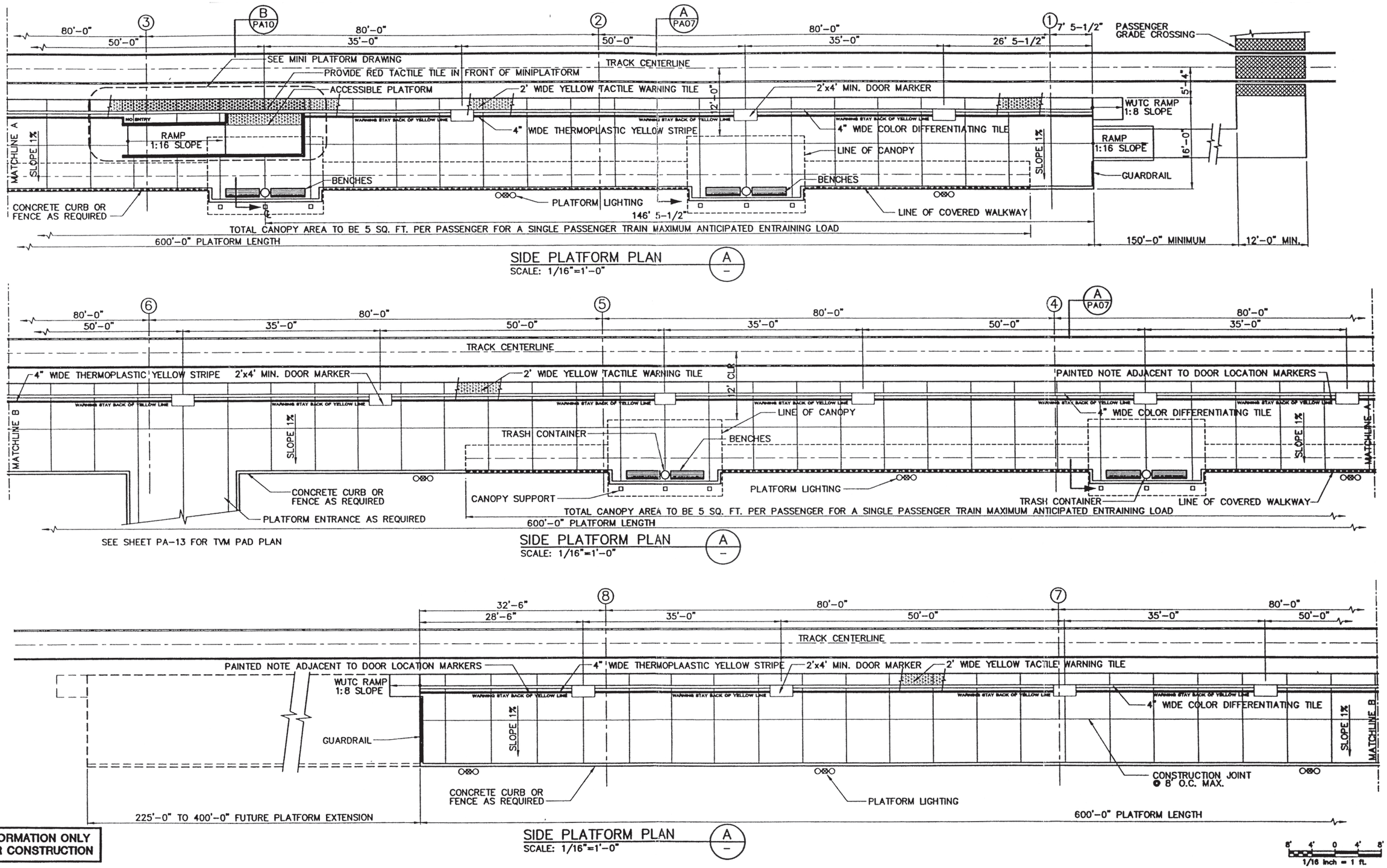
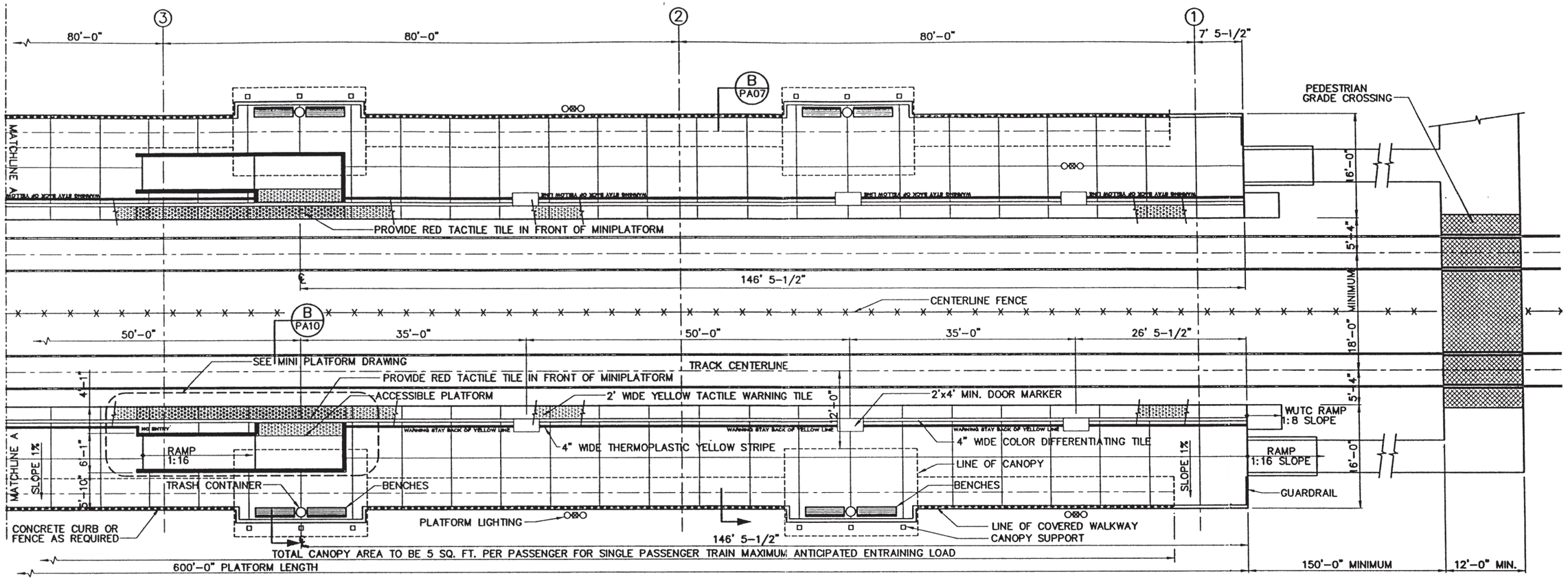


Exhibit A-1: Sample Sounder Station Plan - Side Platform

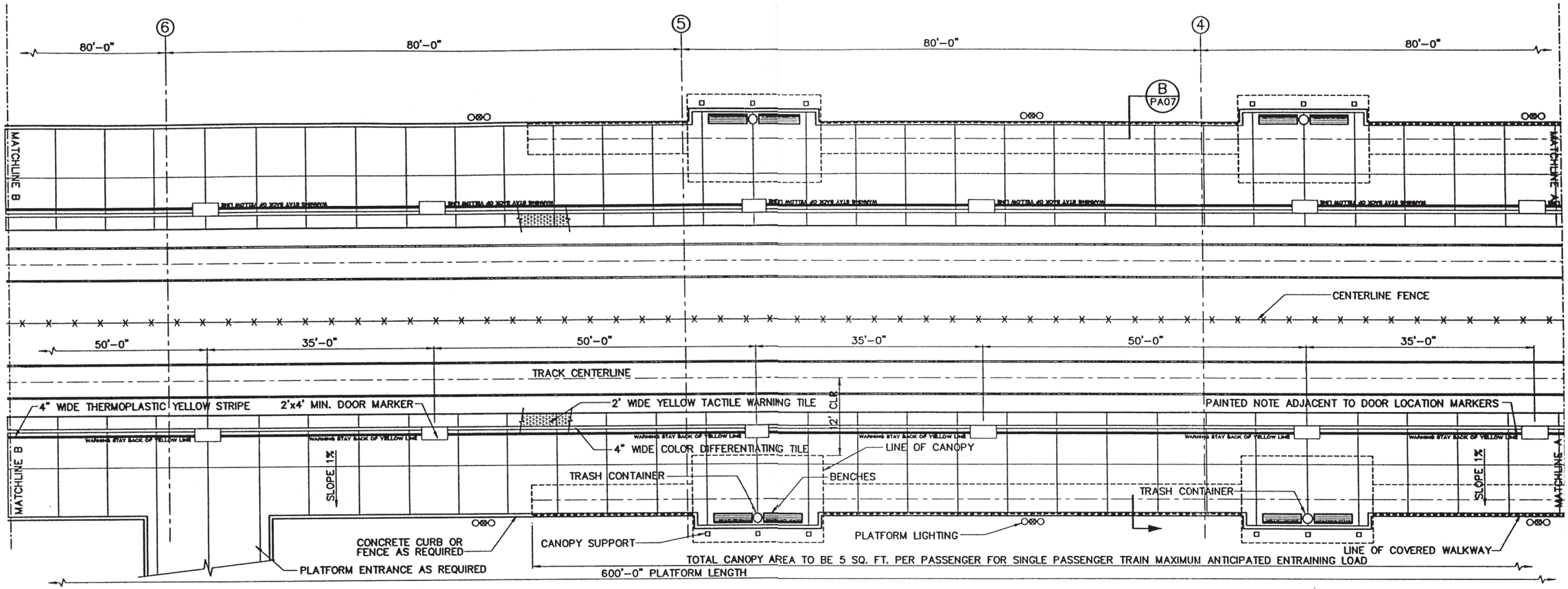


DOUBLE SIDE PLATFORM PLAN (A/–)
SCALE: 1/16"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

8' 4' 0 4' 8'
1/16 inch = 1 ft.

Exhibit A-2: Sample Sounder Station Plan - Double Side Platform (Sheet 1 of 3)



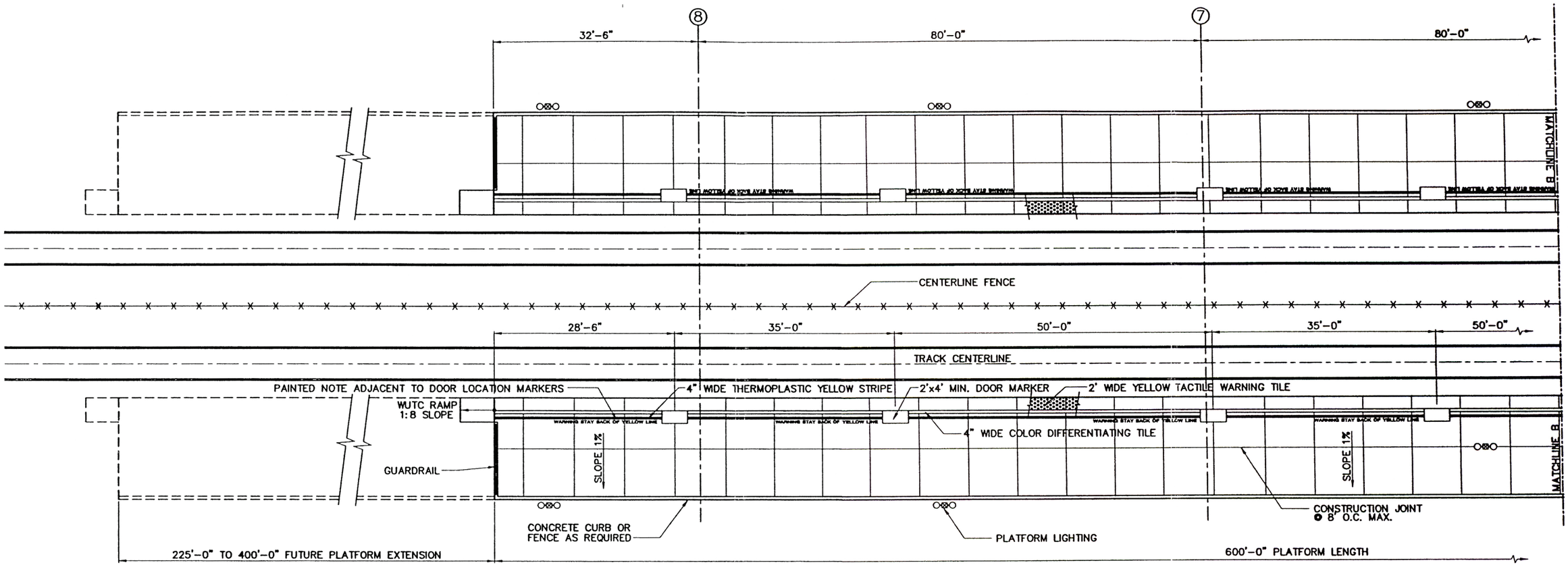
SEE SHEET PA-13 FOR TVM PAD PLAN

DOUBLE SIDE PLATFORM PLAN (A)
SCALE: 1/16"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

8' 4' 0 4' 8'
1/16 inch = 1 ft.

Exhibit A-3: Sample Sounder Station Plan - Double Side Platform (Sheet 2 of 3)

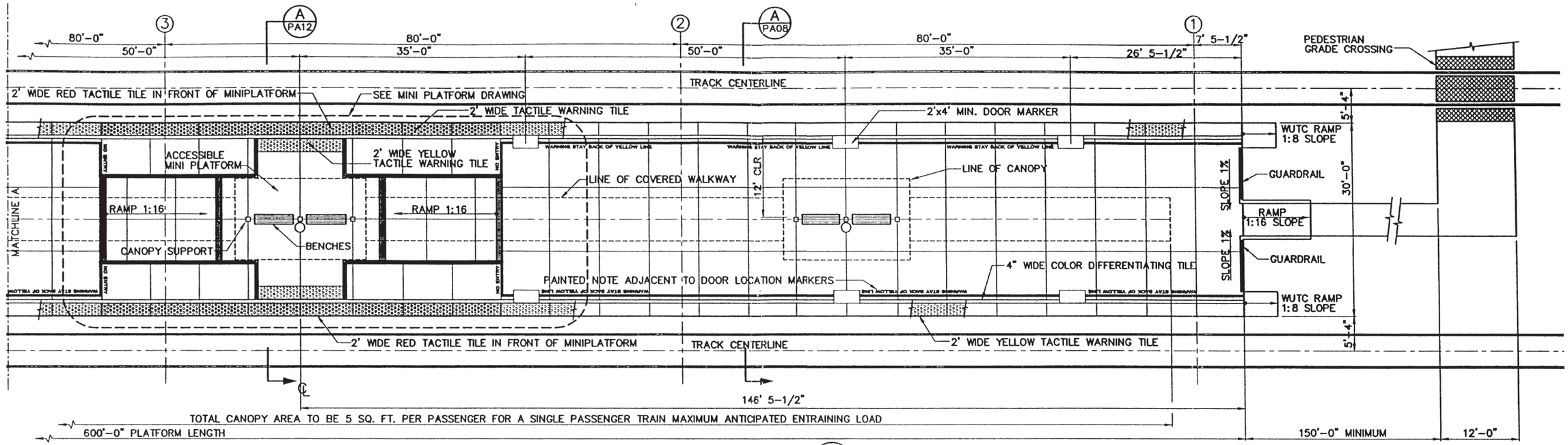


DOUBLE SIDE PLATFORM PLAN (A/-)
SCALE: 1/16"=1'-0"

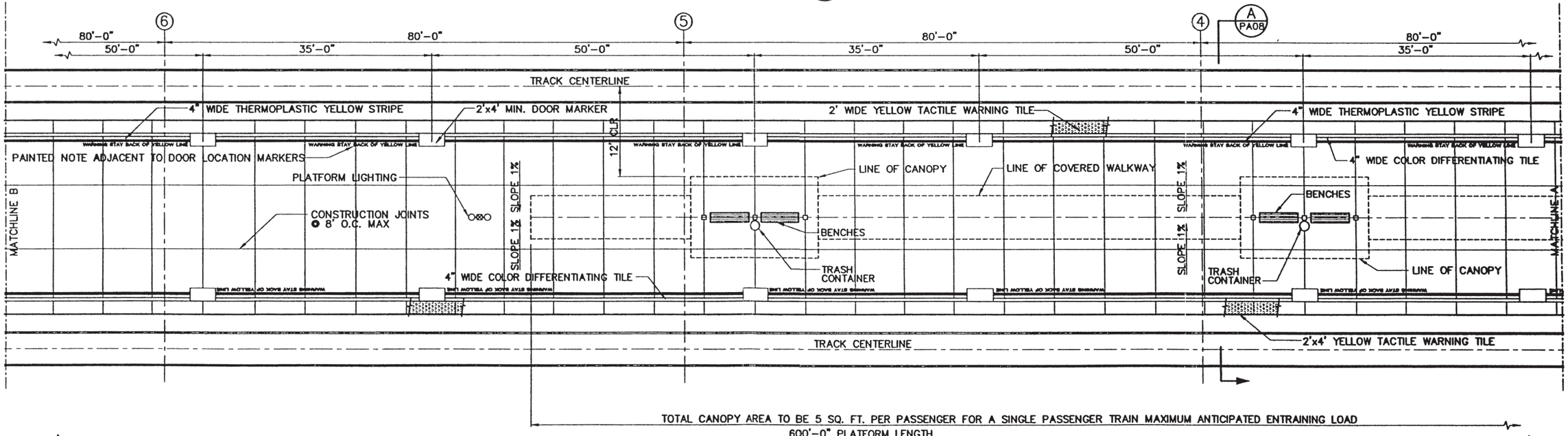
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

8' 4' 0 4' 8'
1/16 inch = 1 ft.

Exhibit A-4: Sample Sounder Station Plan - Double Side Platform (Sheet 3 of 3)



CENTER PLATFORM PLAN (A/PA12, A/PA08)
SCALE: 1/16"=1'-0"

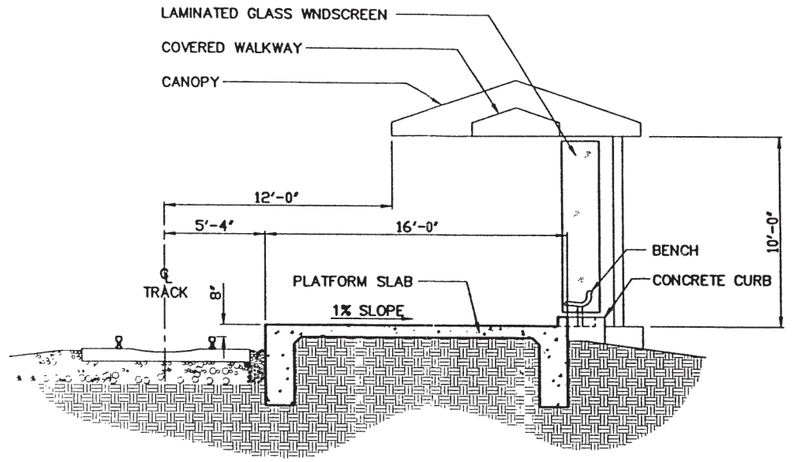


CENTER PLATFORM PLAN (A/PA08)
SCALE: 1/16"=1'-0"

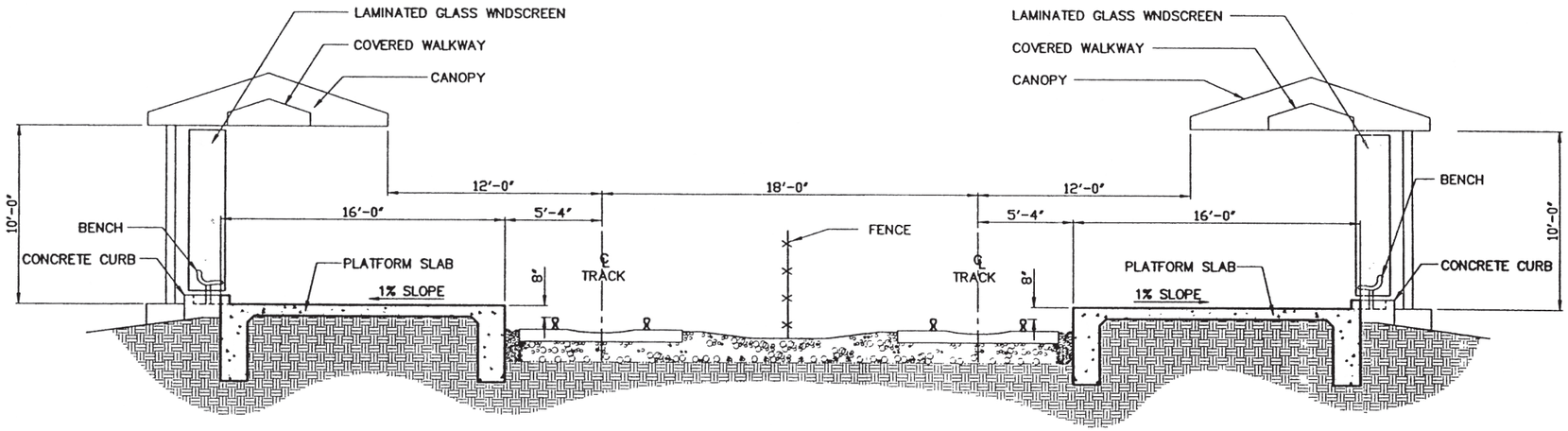
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

8' 4' 0 4' 8'
1/16 inch = 1 ft.

Exhibit A-5: Sample Sounder Station Plan - Center Platform



SINGLE SIDE PLATFORM SECTION A
SCALE: 1/8"=1'-0"

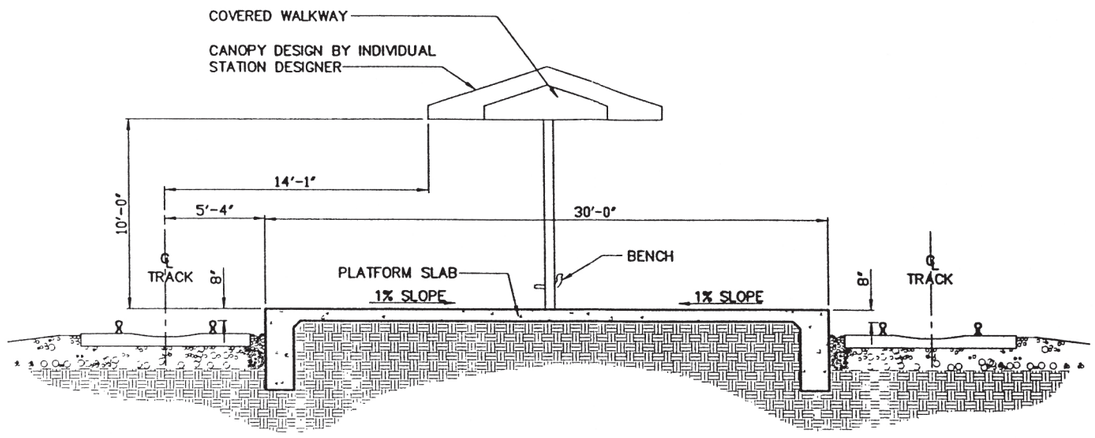


DOUBLE SIDE PLATFORM SECTION B
SCALE: 1/8"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

4' 2' 0 2' 4'
1/8 inch = 1 ft.

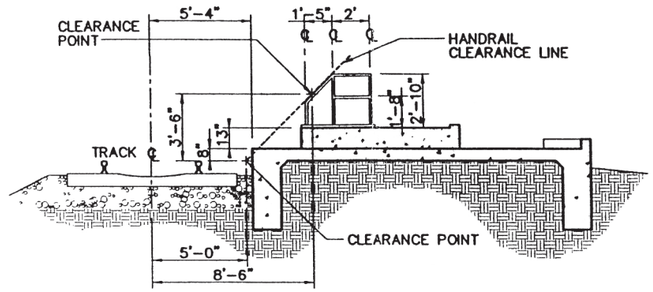
Exhibit A-6: Sample Sounder Station Plan - Sections, Single and Double Side Platforms



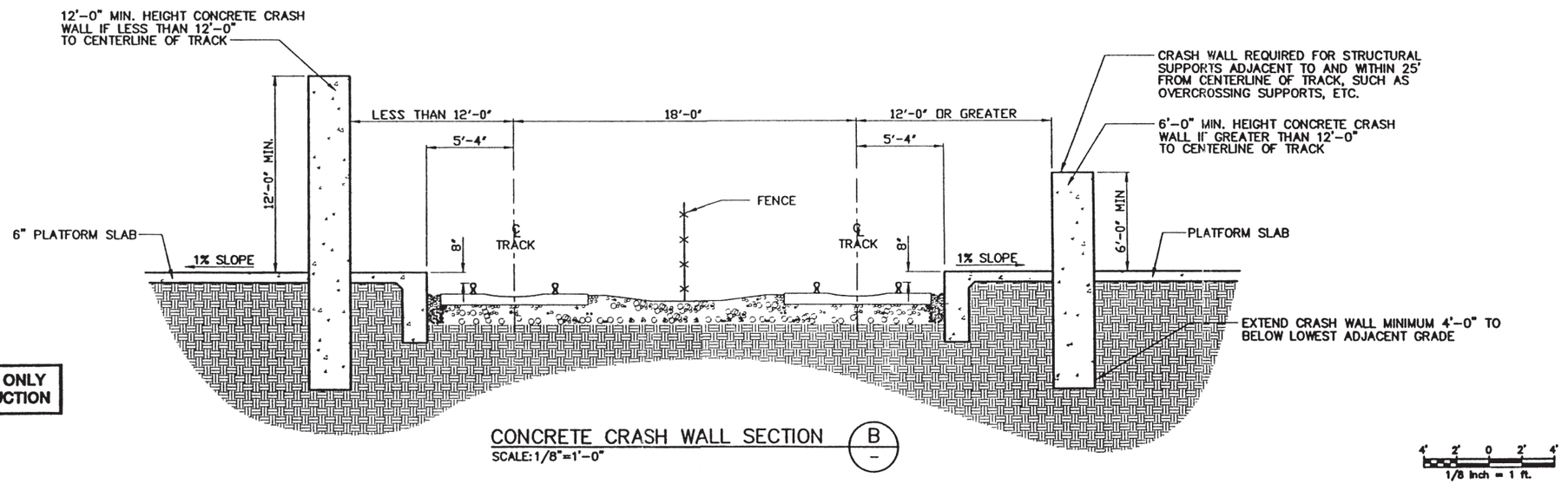
PLATFORM SECTION (A/–)
SCALE: 1/8"=1'-0"

4' 2' 0 2' 4'
1/8 inch = 1 ft.

Exhibit A-7: Sample Sounder Station Plan - Platform Section, Center Platform



HANDRAIL CLEARANCE (A/–)
SCALE: 1/8"=1'-0"

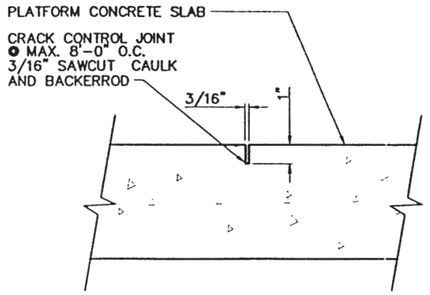


CONCRETE CRASH WALL SECTION (B/–)
SCALE: 1/8"=1'-0"

4' 2' 0 2' 4'
1/8 Inch = 1 ft.

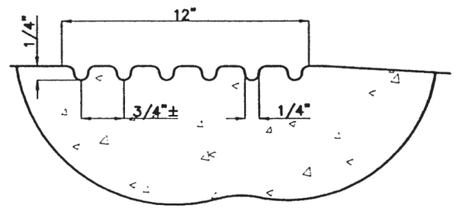
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

Exhibit A-8: Sample Sounder Station Plans - Platform Sections, Crash Wall and Handrail Clearances



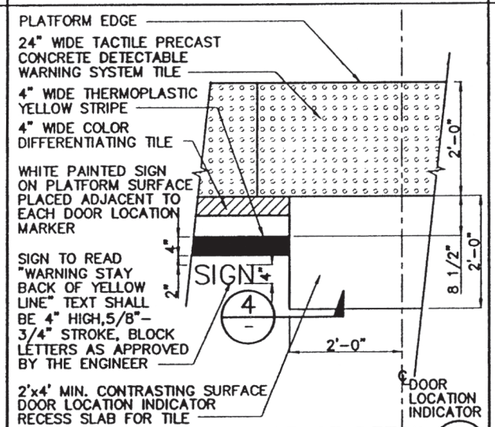
CRACK CONTROL JOINT DETAIL 12

SCALE: 1-1/2"=1'-0"



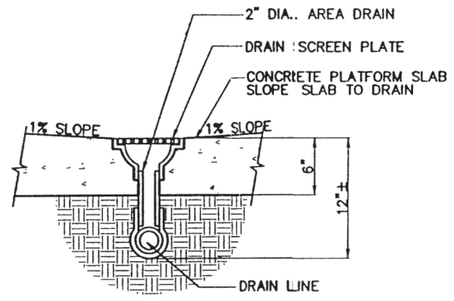
GROOVED CONC. SURFACE DETAIL 11

SCALE: NONE



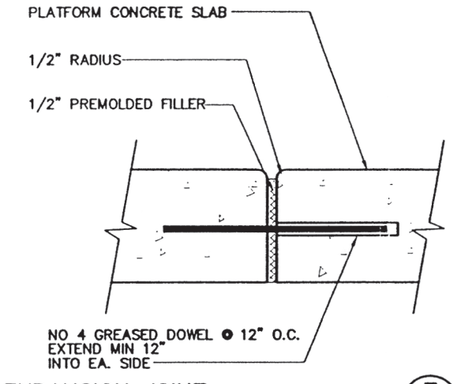
TACTILE WARNING SURFACE DETAIL 9

SCALE: 3/8"=1'-0"



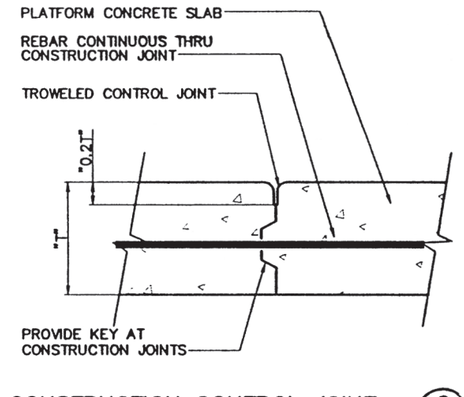
AREA DRAIN DETAIL 8

SCALE: 3/4"=1'-0"



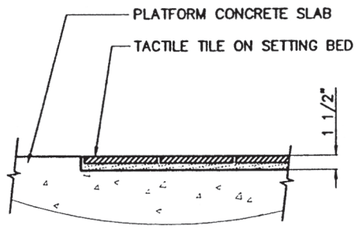
EXPANSION JOINT 7

SCALE: 1-1/2"=1'-0"



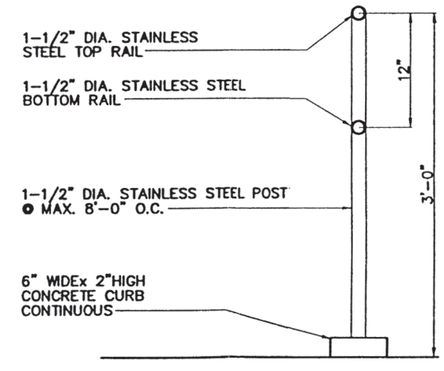
CONSTRUCTION CONTROL JOINT 6

SCALE: 1-1/2"=1'-0"



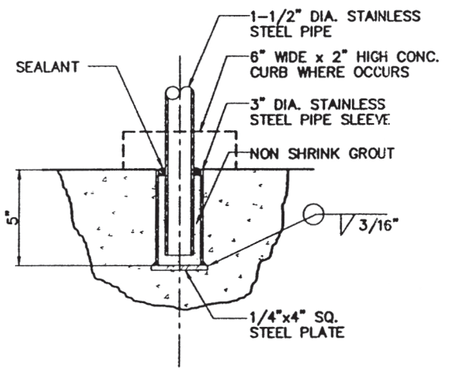
TACTILE WARNING SURFACE DETAIL 4

SCALE: 3/4"=1'-0"



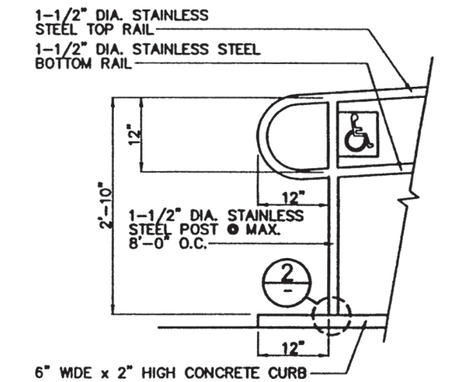
HANDRAIL DETAIL 3

SCALE: 3/4"=1'-0"



HANDRAIL BASE DETAIL 2

SCALE: 3/8"=1'-0"

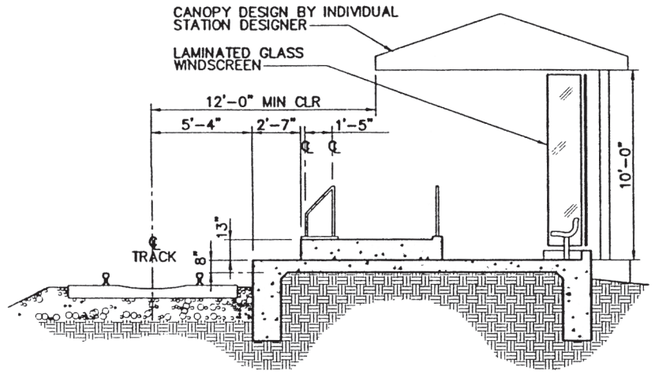


HANDRAIL DETAIL 1

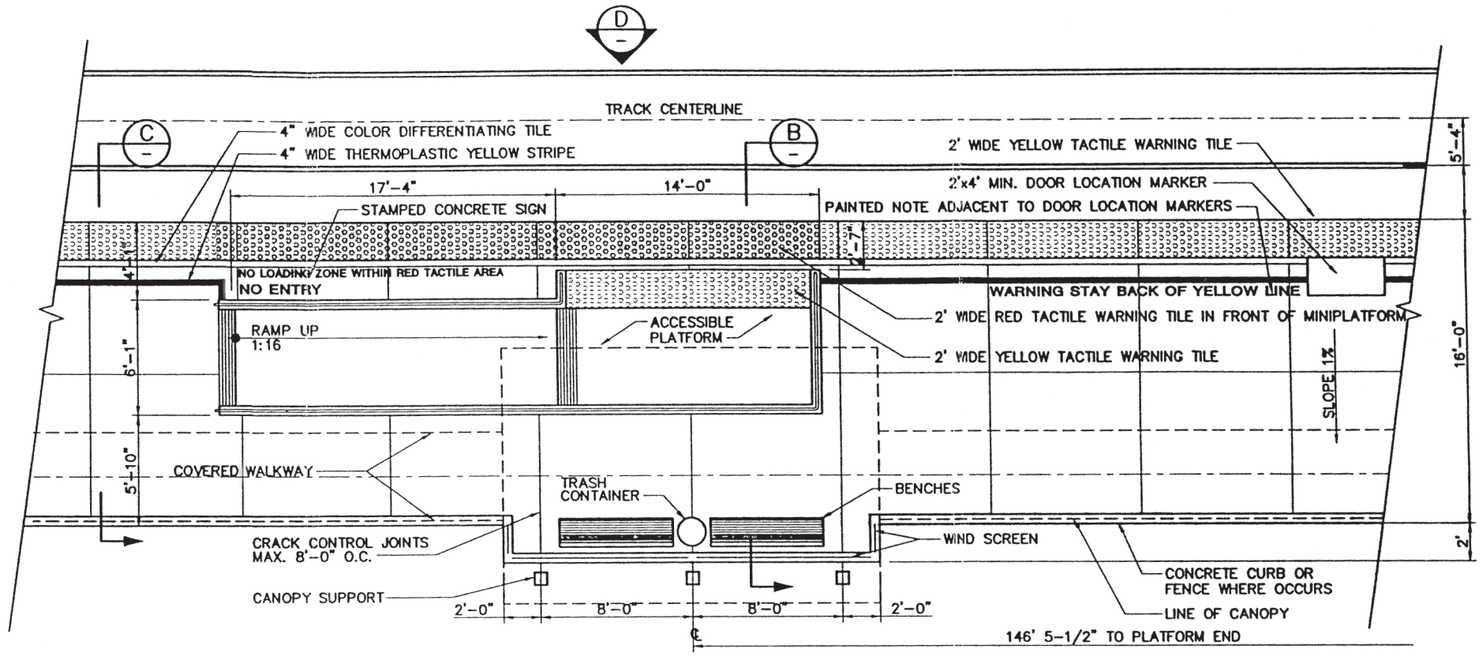
SCALE: 1-1/2"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

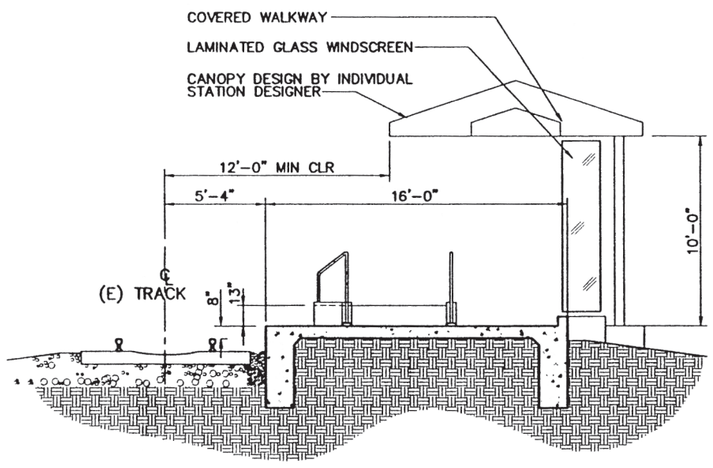
Exhibit A-9: Sample Sounder Station Plans - Platform Details, Drawings 4 & 9 Tactile Warning Surface



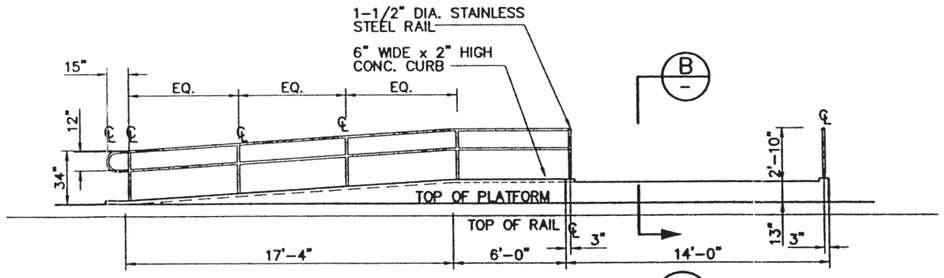
MINI PLATFORM – SECTION B
SCALE: 1/8"=1'-0"



MINI PLATFORM – PLAN A
SCALE: 1/8"=1'-0"



MINI PLATFORM – SECTION C
SCALE: 1/8"=1'-0"

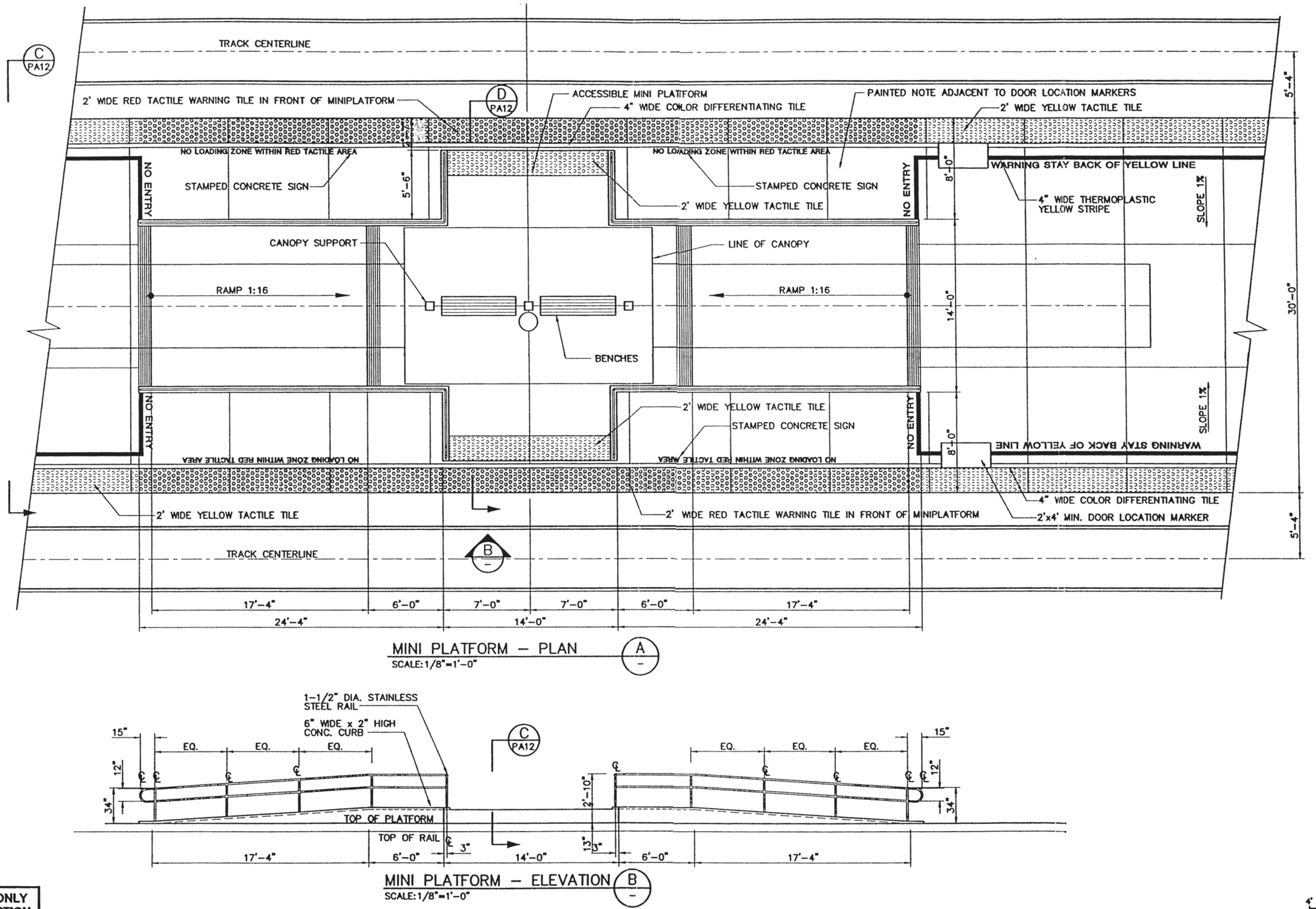


MINI PLATFORM – ELEVATION D
SCALE: 1/8"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

4' 2' 0 2' 4'
1/8 inch = 1 ft.

Exhibit A-10: Sample Sounder Station Plan - Mini-High Platform Plan, Sections & Elevation - Side Platform



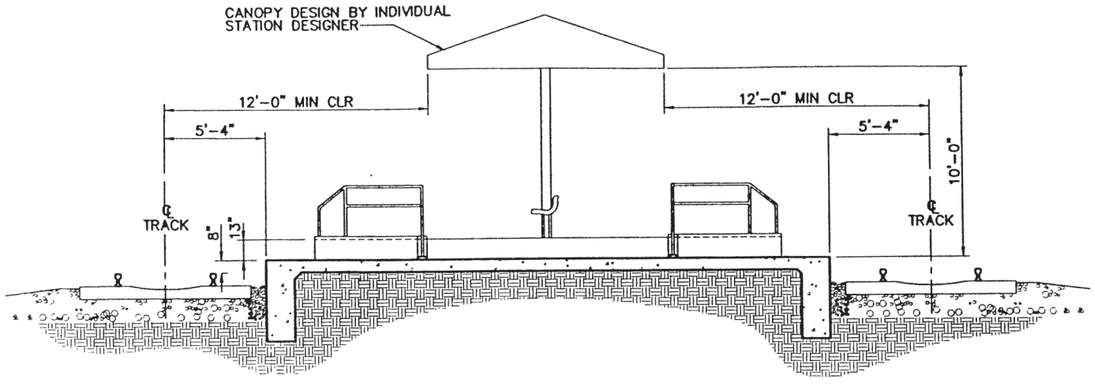
MINI PLATFORM – PLAN (A)
SCALE: 1/8"=1'-0"

MINI PLATFORM – ELEVATION (B)
SCALE: 1/8"=1'-0"

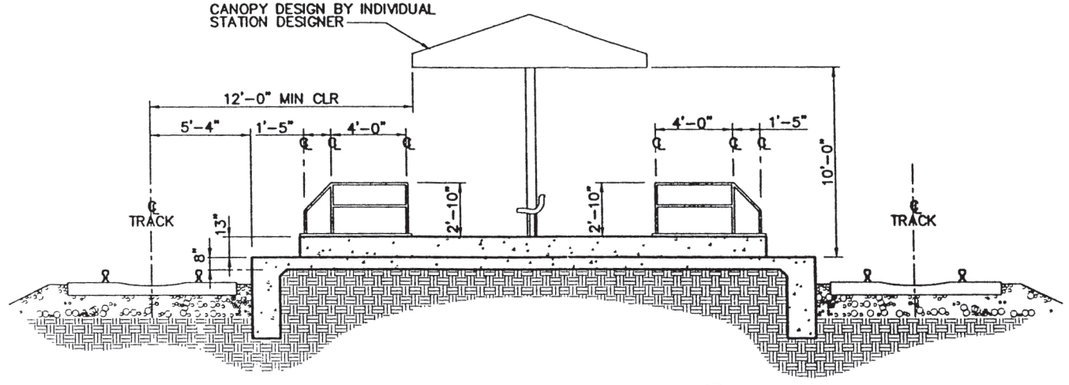
FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

4' 2' 0 2' 4'
1/8 inch = 1 ft.

Exhibit A-11: Sample Sounder Station Plan - Mini-High Platform Plan & Elevation - Center Platform



MINI PLATFORM – ELEVATION B
SCALE: 1/8"=1'-0"

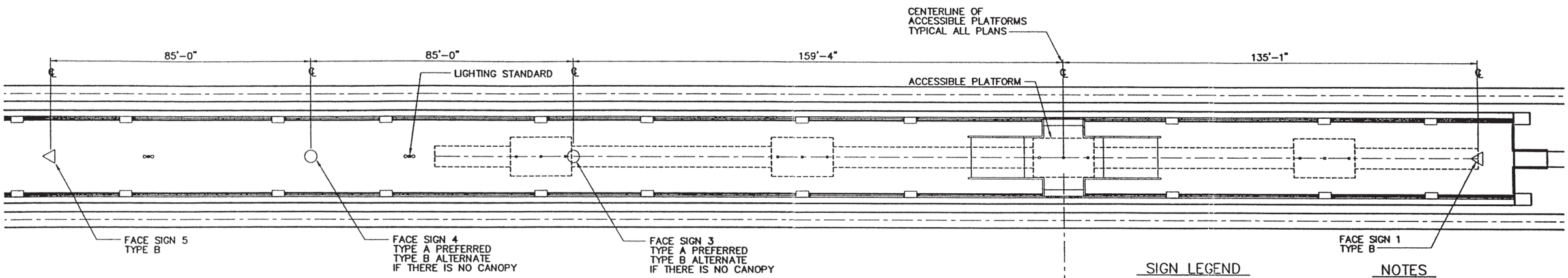


MINI PLATFORM – SECTION A
SCALE: 1/8"=1'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

4' 2' 0 2'
1/8 inch = 1 ft

Exhibit A-12: Sample Sounder Station Plan - Mini-High Platform Sections - Center Platform



POSITION MARKER SIGNS – CENTER PLATFORM (B)
SCALE: 1"=32'-0"

NOTE: A four-car consist is shown but ST Sounder consists can range from three to ten cars in length.

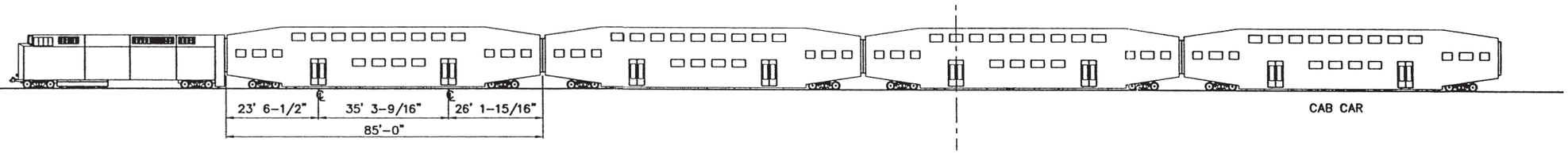
SIGN LEGEND

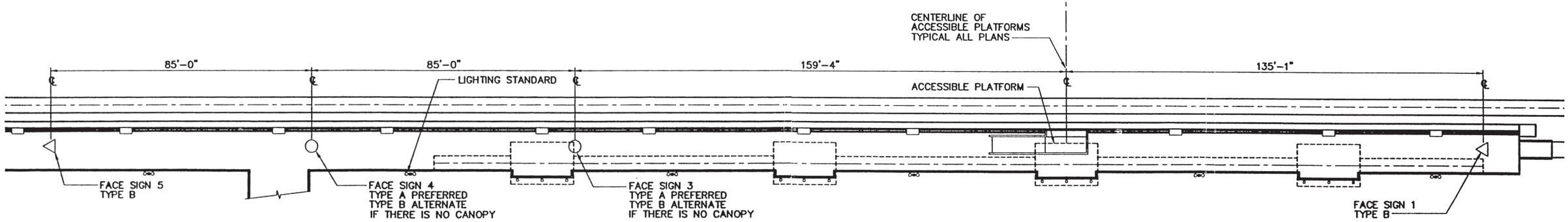
- ○ TYPE A
- ◁ TYPE B
- □ TYPE C

NOTES

1. SIGNS SHALL BE ORIENTED FACING TRAIN, AND AT RIGHT ANGLE TO TRACK
2. TYPE A SIGN MAY BE PLACED ON TOP OF A CANOPY, OR LIGHT STANDARD, OR ANY VERTICAL FEATURE BETWEEN 10 AND 15 FEET FROM CENTERLINE OF TRACK PROVIDED VISIBILITY IS CLEAR TO THE APPROACHING ENGINEER.

   IF NO SUITABLE VERTICAL FEATURE IS AVAILABLE, USE POST IN PLATFORM. (TYPE B)
3. CONTRACTOR TO FURNISH SHOP DRAWINGS FOR ACTUAL PLACEMENT AT EACH STATION.





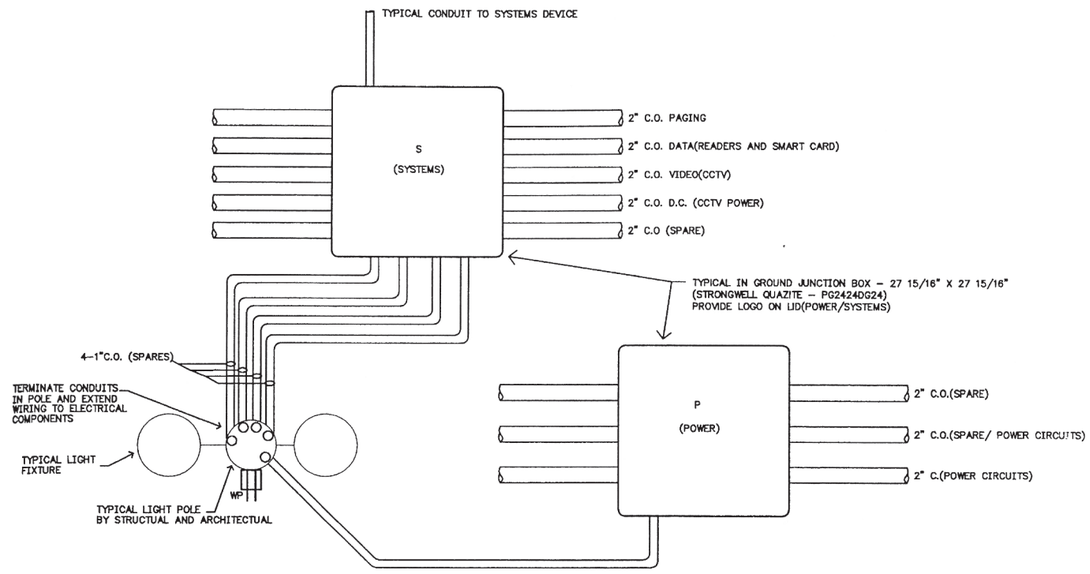
POSITION MARKER SIGNS – SIDE PLATFORM (A)
SCALE: 1"=32'-0"

FOR INFORMATION ONLY
NOT FOR CONSTRUCTION

ALL SIGNAGE DRAWINGS IN DRAFT FORM ONLY
SOUNDTRANSIT RAILROAD ENGINEER WILL
ISSUE REVISED DRAWINGS WHEN AVAILABLE

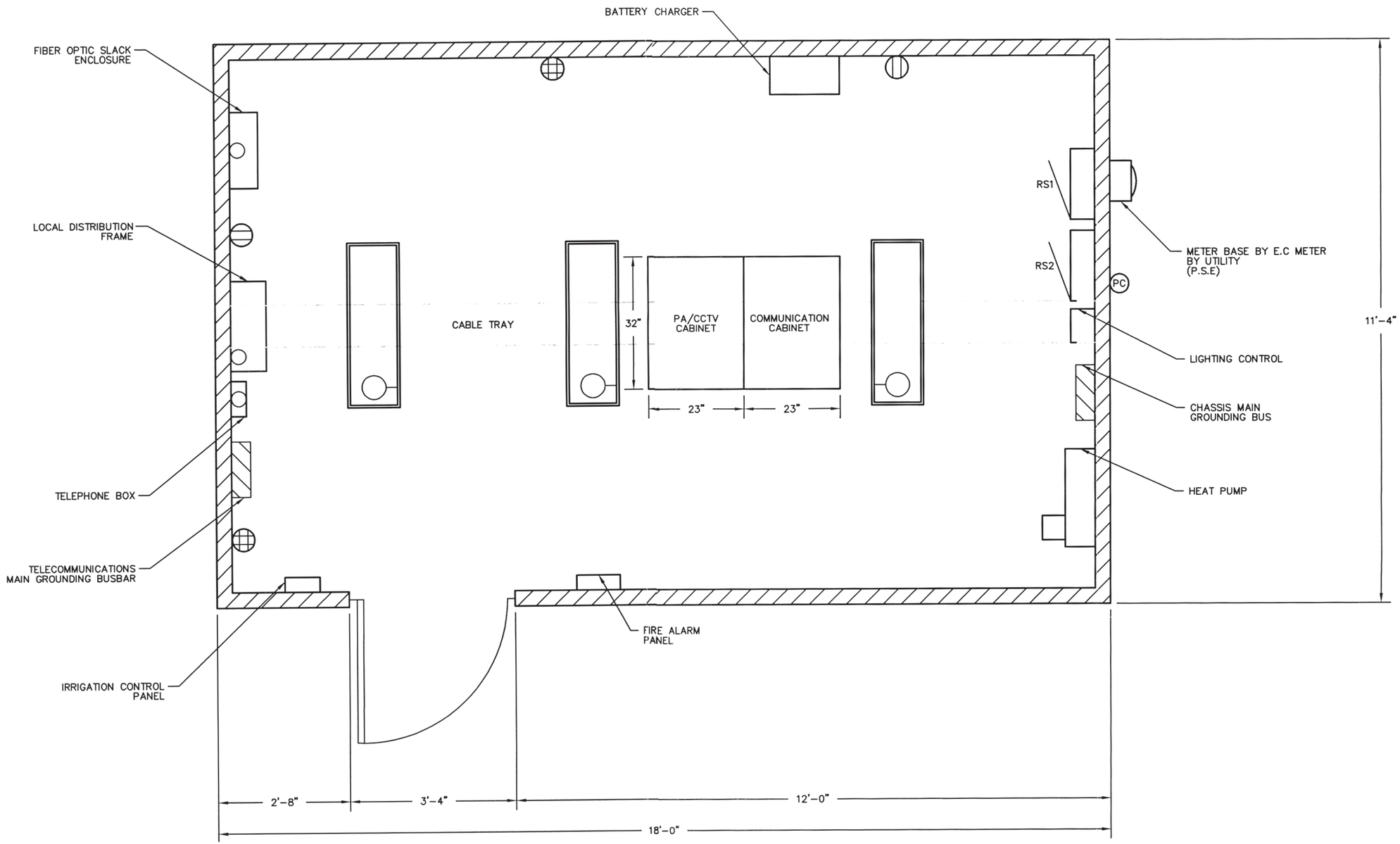
16 8 0 8 16
1 inch = 32 ft.

Exhibit A-13: Sample Sounder Station Plan - Position Marker Signage for Mini-High, Side and Center Platforms



TYPICAL WALKWAY/PLATFORM SYSTEMS AND POWER CONDUITS
SCALE: NONE

Exhibit A-14: Example of Ductwork Schematic for Walkway/Platform Systems & Power Conduits



NOTES:

1. CABINET HEIGHT 84".
2. CABLE TRAY MOUNTED AT 96" HIGH.
3. CABINETS MOUNTED PER SIESMIC ZONE 3 REQUIREMENTS

ISSUED FOR CONSTRUCTION

Exhibit A-15: Layout for Communications Room at Sound Transit Station